DOCUMENT RESUME

ED 138 016 EC 100 650

AUTHOR	Bryant, N. Dale; And Others
TITLE	Leadership Training Institute in Learning Disabilties. Volume I. Final Report.
INSTITUTION	Leadership Training Inst. in Learning Disabilities, Tucson, Ariz.
SPONS AGENCY	Arizona Univ., Tucson. Dept. of Special Education.; Bureau of Education for the Handicapped (DHEW/OE), Washington, D.C. Div. of Educational Services.
BUREAU NO	127145
PUB DATE	72
GRANT	OEG-0-71-4425(604)
NOTE	323p.; For appendixes, see EC 100 651
EDRS PRICE	MF-$0.83 HC-$16.73 Plus Postage.
DESCRIPTORS	*Demonstration Projects; Exceptional Child Research; Exceptional Child Services; Instructional Materials; *Leadership Training; *Learning Disabilities; *Professional Training; Program Administration; *Program Descriptions; Research Reviews (Publications); *Teaching Methods
IDENTIFIERS	Final Reports

ABSTRACT

Presented is the final report of the Leadership Training Institute (LTI) in Learning Disabilities at the University of Arizona. Purposes of the LTI are reported to have been to give technical assistance to the Child Service Demonstration Centers which were alloted funds by the Bureau for the Education of Handicapped Children in eight states (California, Colorado, Mississippi, New Jersey, Ohio, Utah, Washington, and Wisconsin) and to prepare a document which would: (1) survey current research and development and delineate the direction further research should take, (2) survey and describe the professional training programs, (3) survey and describe current materials and methods being used, and (4) describe and analyze current service activities. Sections cover the following topics: "Subject Variables: Definition, Incidence, Characteristics, and Correlates" (N. D. Bryant and J. McLoughlin), "Personnel Training Practices in Learning Disabilties" (C. Kass, et al), "Methods and Materials in Learning Disabilities" (C. Kass and R. Lewis), "Administrative and Service Arrangements in Learning Disabilties" (J. L. Wiederholt, et al), and "Recommendations for Programmatic Research" (N. D. Bryant and J. L. Wiederholt). (IM)

Documents acquired by ERIC include many informal unpublished materials not available from other sources. ERIC makes every effort to obtain the best copy available. Nevertheless, items of marginal reproducibility are often encountered and this affects the quality of the microfiche and hardcopy reproductions ERIC makes available via the ERIC Document Reproduction Service (EDRS). EDRS is not responsible for the quality of the original document. Reproductions supplied by EDRS are the best that can be made from the original.

ED138016

U S DEPARTMENT OF HEALTH. EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

FINAL REPORT

VOLUME I

U. S. O. E. Contract

LEADERSHIP TRAINING INSTITUTE

IN

LEARNING DISABILITIES

N. Dale Bryant, Director

Corrine E. Kass, Associate Director

Sponsored By

Department of Special Education
University of Arizona
George Leshin, Head

and

Program Development Branch, Division of Educational Service
Bureau of Education for the Handicapped
U.S. Office of Education
Laurence M. Lieberman, Learning Disabilities Coordinator

EC100650

FOREWORD

Since 1963 when Congress passed Public Law 88-164 providing funds for training and research in special education, we have been trying to find our way out of a maze of confusion and contradictions in connection with an area now labeled "learning disability". In the original provisions in 1963 no funds were allocated for this area, although some financial help was squeezed out of the provisions for "crippled, or other health impaired, who by reason thereof require special education and related services." Not until 1969 did Congress address itself specifically to the problem of learning disabilities when they passed the Learning Disabilities Act of 1969.

The field was new and congressional support had to be preceded by much study and clarification. Congressmen wanted to know what a learning disability is; how it differs from mental retardation; from emotional disturbance; from other categories of handicap; and how many children are involved. Professional task forces were set up to study various phases of the problem, and Congress appointed an Advisory Committee on the Handicapped to keep itself informed.

There are still many unanswered questions in the field. For example, how do we select children with learning disabilities? Although the disability has been verbally defined, we still do not have an operational definition.

How do we predict a learning disability in a young child? From the studies on etiology and correlates of the disability?

What training is necessary to develop specialists in learning disabilities? What skills and knowledge must they have that regular teachers do not have?

What methods and materials are most effective with the learning disabled? Do we develop new materials or do we use the same materials developed for the regular classroom but apply them differently in a tutoring situation?

What kinds of services are most effective in the schools? What models and alternatives of service are prevalent today? How can they be improved?

How can current programs be evaluated so that we will be able to select the most effective program for a particular locality and situation?

In an effort to answer some of these questions, the present report is very helpful. In 1970 when the Bureau for the Education of Handicapped Children allotted funds to eight states for the purpose of developing model demonstration centers in those states, they also allotted funds for a Leadership Training Institute (LTI) in Learning Disabilities at the University of Arizona. The purpose of the Institute was to give technical assistance to the Child Service Demonstration Centers in the eight states and to prepare a document that would: (a) survey current research and development and delineate the direction further research should take; (b) survey and describe the professional training programs; (c) survey and describe current materials and methods being used; and (d) describe and analyze current service activities.

The report is now in your hands. It will be noted from the above demands that if the task assigned to the LTI was to be accomplished in one year, the staff involved must be superhuman. And indeed they were nearly that. The authors, Dr. Dale Bryant, Dr. Corrine Kass, and Dr. Lee Wiederholt, accepted this responsibility and have herein presented a wealth of material. They secured the assistance of consultants and of graduate assistants and have put together the first step in an effort to answer many of the questions confusing the field.

The contents of the report on the chaotic results of research, the nature and content of training programs, and the diverse service programs that have evolved in the various states are clearly stated and documented by the authors. The appendix contains much extremely relevant data, information, and theoretical constructs.

For those who are seeking a conclusive operational definition of the field and a single system of diagnosis and remediation, this report will not suffice. But for serious students and practitioners the report does lay before them the current facts and information from which can be generated more educationally relevant research and the need for more innovative training programs and school practices.

Samuel A. Kirk
Tucson, Arizona
August 1972

OPEN LETTER FROM DR. GIL RAGLAND, PRESIDENT OF DCLD

After reviewing the materials made available by the LTI, my reactions are as follows:

This report from the University of Arizona Leadership Training Institute in Learning Disabilities seems to me to make some rather distinct contributions heretofore not made in learning disabilities. At least these contributions have not been made available in any single document or in any fashion that can be retrieved at this time.

First, the document brings together a clear perspective on the population, based not on a single approach to the problem, but a definitional approach that allows for a continuum of learning disability problems. It recognizes that the incidence figures will vary based on the operationalized definition and also brings into focus the categorization of a population that is probably most homogeneous in its underachievement.

Second, the document brings to light another very interesting aspect of professional activities in learning disabilities, and that is the report of the teacher training activities. The document has one limitation in that all the reported training activities are in federally-funded programs. However, these may prove to be the majority of the programs which are seriously involved in preparing learning-disability specialists. The training program section is extremely interesting and comprehensive in its review of historical developments in preparing specialists, and then, more importantly, the inclusion of rationale and philosophy of programs, plus some information such as program faculty, student selection, and job market.

Third, the document brings together a historical perspective on methods and materials reportedly used by the field. This section, then, begins to appeal to a wider segment of the population concerned with learning disabilities. The value of including this material in a publication of this type is extremely important for the teaching field. That is, it has usefulness to the practitioner working with children. No other document of this type has attempted to appeal to as large a segment of the CEC membership working with handicapped children. While the methods and materials section will be sought out by practitioners, by the same token, the report may be abused in that practitioners frequently see something new and try it when it has not been really validated. That, historically, has been true of special education for much of our recorded activity.

Fourth, this report is helpful in looking at practices in administrative services for learning-disability youngsters. No other document has tried to review as comprehensively as this one the practices of serving this population. Some references, such as Johnson and Myklebust and Lerner, do review some of the practices and procedures for implementing programs, but this document is much broader in its scope. From this point of view, it has a wide appeal to program administrators and training programs, but in more particular, in public school practice. In its entirety, this section has appeal in its contribution of the LTI to model centers and in its review of the responsibilities and mandates for replicating the programs through model centers.

The LTI report is a survey, an impressionistic state-of-the-art type of compilation. It is not intended to be more and is subject to limitation of funding, time, and organization. It is a good perspective on the state of the art in learning disabilities.

The implications for DCLD are the following:

1. The state of the art is diverse and changing but the DCLD membership represents this diversity and needs direction. Those worthwhile practices of LD teachers, programmers, and researchers need to be promoted and documented for distribution. Also evaluation and standards need to be imposed.

2. DCLD could use this document to determine minimal standards of programs for directions in certification, constant practices, and evaluation. It is clear that LD whether acknowledged this way or not is becoming an approach to teaching 10-20% of the youngsters in schools. These youngsters deserve better than they are getting. Today is the first day of the rest of their lives.

Gil Ragland

Confusion say. . .

The young immature art of learning disabilities
must remain somewhat amorphous through the process
of becoming defined, delineated, and distilled in order for
more accurate and precise measurement and treatment
of the population to evolve.
cek

PREFACE

The University of Arizona Leadership Training Institute in Learning Disabilities (LTI) is pleased to present this report to the Division of Educational Services, Bureau of Education for the Handicapped, US Office of Education. This report was prepared under Grant #OEG-0-71-4425 604, Project #127145.

The overall purpose of the LTI was to make a statement about the direction in which the field of learning disabilities is moving. Also, the LTI was to provide technical assistance to State Child Service Demonstration Programs (CSDP's). In gearing up for this task, the LTI surveyed the needs in the field in the areas of research, training, and service arrangements. A "state of the art" in learning disabilities is presented in this report in a kaleidoscopic fashion--more impressionistic than photographic.

Several years could be spent gathering data about learning disabilities from a number of disciplines. This report does not purport to be such an in-depth study. It is, rather, based on impressions gathered from a variety of sources--teachers, specialists, generalists, psychologists, state personnel--in short, wherever and whenever it was possible to collect information, opinions and recommendations. Meetings sponsored by the LTI under this grant ranged from a large professional organization audience broken into small discussion groups to a Seminar of Scholars, all of whom were asked to present their views. The methods for the surveys included observations of CSDP's, collecting facts and figures, and gathering impressions from reading, listening, and talking.

Specifically, this year's project (1971-1972) has resulted in the following:

1. A number of consultant meetings were held at the LTI, in groups and individually for guidance and for recommendations which could be incorporated into the final report.

2. Technical assistance was provided to the CSDP's in eight states in the form of (a) visits to the programs by LTI staff, and (b) an invitational conference for the program personnel held in Tucson.

3. A survey was made of research findings in learning disabilities, specifically of subject variables (characteristics which are associated with learning disabilities).

4. A report of 1971-72 federally-funded personnel training practices in the field was compiled.

5. A survey was made of methods and materials in the field of learning disabilities.

6. A survey was made of administrative service arrangements in the field of learning disabilities, which includes descriptions of the eight CSDP's.

The following pages of Volume I will present the results of the above tasks. Appendices for this report comprise Volume II.

All the names of those who contributed to this report are listed in the following pages. Grateful acknowledgement is given to CSDP personnel, LTI consultants, and respondents to letters and telephone calls. Special recognition must be given to the graduate students at the University of Arizona who gave generously of their time, and to the secretaries who provided typing and helpful assistance throughout this project.

LTI STAFF

9

LTI STAFF

DR. N. DALE BRYANT
Project Director

DR. CORRINE E. KASS
Associate Project Director

DR. J. LEE WIEDERHOLT
Research Associate

DR. SAMUEL A. KIRK
Consultant-in-Residence

MS. RENA LEWIS
Administrative Assistant

DOCTORAL STUDENT STAFF

James DeRuiter
Donald Deshler
Laura Fliegner
Marilyn Johnson
Charles Kaiser
James McLoughlin
John Wissink

STUDENT AIDES

Ernest Archambault
Rana Archambault
Carol Deshler
Joan Dorfman
Pam Hurst
Helen Marie Pearce
Diana Ross
Marsha Schubert
Nancy Stiefel
Thomas Valeski
Joseph Wade

TYPISTS

Marie Aavang
Alice Anderson
Linda Cooper
Maureen Hoffman
Johnine Taylor
Charlene Wade

ROSTER OF CONSULTANTS

DR. HOWARD ADELMAN
College of Education
University of California at Riverside
Riverside, California

DR. VIRGINIA BROWN
Department of Special Education
University of Minnesota
Duluth, Minnesota

DR. JAMES CHALFANT
Special Education Laboratory
University of Illinois
Urbana, Illinois

DR. EUGENE ENSMINGER
Coordinator of Learning Disabilities
Department of Special Education
Georgia State College
Atlanta, Georgia

DR. HYMAN GARDSBANE
719 Texas Street
Shreveport, Louisiana

DR. DONALD HAMMILL
Director, Learning Disabilities Program
Department of Special Education
Temple University
Philadelphia, Pennsylvania

DR. NORRIS HARING
Director, Experimental Education Unit
Mental Retardation and Child Development Center
University of Washington
Seattle, Washington

DR. FRANK HEWETT
Chairman, Area of Special Education
Department of Education
University of California at Los Angeles
Los Angeles, California

DR. FLOYD HUDSON
Coordinator of Learning Disabilities
Special Education Department
University of Kansas
Lawrence, Kansas

DR. RALEIGH HUIZINGA
Director, Research and Evaluation Center for Learning
University of Texas
Dallas, Texas

DR. DORIS JOHNSON
Department of Communicative Disorders
Northwestern University
Evanston, Illinois

DR. ELEANORE KENNEY
Director, Miriam School
St. Louis, Missouri

DR. BARBARA KEOGH
Graduate School of Education
University of California at Los Angeles
Los Angeles, California

MR. FRANK KING
Consultant, Psychological Services and
Specific Learning Disabilities
Special Education Division
State Department of Public Instruction
Des Moines, Iowa

MR. LAURENCE M. LIEBERMAN
Learning Disabilities Coordinator
Program Development Branch
Bureau of Education for the Handicapped
Washington, D. C.

DR. JEANNE McCARTHY
Director, Diagnostic Services
School District #54
Schaumburg, Illinois

DR. HAROLD McGRADY
Director, Learning Disabilities Program
Department of Communicative Disorders
Northwestern University
Evanston, Illinois

DR. JOHN McLEOD
Department of Special Education
College of Education
University of Saskatchewan
Saskatoon, Canada

DR. J. GERALD MINSKOFF
Special Education Department
Southern Connecticut State College
New Haven, Connecticut

DR. PATRICIA MYERS
Chairman, Department of Communication
Disorders
Our Lady of the Lake College
San Antonio, Texas

DR. MARIO PASCALE
Coordinator, Unit on Learning
Disabilities
Division of Training Programs
Bureau of Education for the Handicapped
Washington, D. C.

DR. HOMER REED, Jr.
Associate Professor of Pediatrics
(Psychology)
New England Medical Center Hospitals
Boston, Massachusetts

DR. GIL RAGLAND
Chairman, Department of Special
Education
School of Education
University of North Carolina
Chapel Hill, North Carolina

DR. ROBERT RIDGWAY
Associate Dean
School of Education
University of Kansas
Lawrence, Kansas

DR. MARGARET SCHEFFELIN
Consultant, Education of Educationally
Handicapped Children
State Department of Education
Sacramento, California

DR. GERALD M. SENF
Department of Psychology
University of Illinois
Chicago, Illinois
and
Illinois State Pediatric Institute
Chicago, Illinois

DR. CHARLES STROTHER
Director, Child Development and Mental
Retardation Center
University of Washington
Seattle, Washington

CONTENTS

Foreword by Samuel A. Kirk iii

Open Letter from Gil Ragland, President of DCLD. v

Preface. viii

Leadership Training Institute Staff. x

Roster of Consultants. xi

Contents xiii

Meetings and Activities Sponsored by the LTI, 1971-72. 1
by Rena Lewis

Subject Variables: Definition, Incidence, Characteristics, and Correlates 5
by N. Dale Bryant with James A. McLoughlin

- Types of Subject Variables. 7
- Relation of Subject Variables to Definition of Learning Disabilities. 8
- Minimal Brain Dysfunction and Underachievement as Bases of Defining Learning Disabilities 9
- Measures of Expected Achievement. 19
- Articles Reviewed 21
- Literature Reviewed 27
- Incidence 29
- Framework for Summarizing Subject Variables 35
- Areas of Learning Disabilities. 35
- Learning Disabilities in Basic Reading Skills 36
- Learning Disabilities in Arithmetic and Mathematics 42
- Learning Disabilities in Spelling 46
- Disabilities in Handwriting 48
- Language Disabilities 50
- Other Learning Disabilities 56
- Etiology. 57
- Correlates and Predictors of Learning Disabilities. 61
- Overlap of Subject Variables. 75
- Summary and Recommendations 77
- Bibliography. 80

Personnel Training Practices in Learning Disabilities. 159
by Corrine E. Kass with Donald D. Deshler,
Charles Kaiser, and Joseph Wade

- Introduction. 161
- Historical Perspective. 161
- Program Practices (1971-72) 170
  - Program Goals, Rationale, and Philosophy 172
  - Program Faculty. 179
  - Program Content. 180

Student Selection Criteria . . . 185
Job Market . . . 187
Inservice Training . . . 187
Teacher Certification . . . 189
Current Status of Teacher Certification in Learning Disabilities . . . 190
Factors Accounting for the Above Status . . . 192
Recommendations on Teacher Certification . . . 195
Program Assistance Grants (1972-73) . . . 196
Concluding Statement . . . 197
References . . . 198

Methods and Materials in Learning Disabilities . . . 201
by Corrine E. Kass with Rena Lewis, James DeRuiter, Marsha Schubert, and Ernest Archambault

Introduction . . . 203
Philosophical Discussion of Methods and Materials in Learning Disabilities . . . 206
Empirical Investigations . . . 208
Selected Traditional Treatments . . . 208
A Bibliography of Surveys on Treatment and Content . . . 215
Survey of Commercial Materials . . . 217
Survey of DCLD Membership . . . 218
Summary of Empirical Investigations . . . 222
Conclusions and Recommendations . . . 223
References . . . 229

Administrative and Service Arrangements in Learning Disabilities . . . 233
by J. Lee Wiederholt with Donald Deshler, Marilyn Johnson, and Helen Marie Pearce

Introduction . . . 235
Federal Assistance . . . 235
Historical Development . . . 235
Child Service Demonstration Programs . . . 237
Other Programs Funded by USOE . . . 249
Summary . . . 250
Action at the State Level . . . 251
Laws and Definition . . . 251
Incidence Figures . . . 259
Number Served . . . 259
Age Range . . . 260
Certification of Disabilities . . . 260
Educational Program . . . 261
Summary . . . 262
Factors Relating to Service Arrangements . . . 263
Organizational View of the Field of Learning Disabilities . . . 263
Organizations and Factors which Influence Service . . . 265
Government . . . 268
Service Organizations . . . 269
Scientific Profession . . . 270
The University . . . 270
Product Organization . . . 271

The Service Profession. 271
Instructional Settings. 271
Learning Disabilities Pupils. 281
Media 281
Trends in Education 282
Management Techniques 283
Summary 294
Conclusions and Recommendations 294
Recommendations. 296
References 298

Recommendations for Programmatic Research 301
by N. Dale Bryant and J. Lee Wiederholt

MEETINGS AND ACTIVITIES
SPONSORED BY THE LTI, 1971-72

Rena Lewis

August 1972

MEETINGS AND ACTIVITIES

SPONSORED BY THE LTI, 1971-72

The Leadership Training Institute in Learning Disabilities, a project of the Bureau of Education for the Handicapped and the Department of Special Education of the University of Arizona, has employed many different methods and activities in its study of the field of learning disabilities. The purpose of this section is to summarize the activities of the LTI this year.

At the beginning of the project year, the LTI invited several leaders in the field of learning disabilities to serve as consultants to the project. The consultants were asked to write a paper reacting to the goals of the LTI, as an initial step in planning the year's work. A summary of the consultants' papers appears in Appendix A.

Planning Meeting, October 1971

Four consultants--Drs. James Chalfant, Hyman Gardsbane, Frank Hewitt, and Homer Reed--were invited to meet with the LTI staff to discuss plans for the year's work. Appendix B contains a report of this meeting.

Conference of State Child Service Demonstration Programs, November 1971

In order to coordinate plans for technical assistance to the eight federally-funded State Child Service Demonstration Programs, the LTI invited leadership personnel from these programs to a conference in Tucson. Appendix C presents a report of this meeting. Descriptions of the State Child Service Demonstration Programs appear in the section of this report on administrative and service arrangements.

Conference of Teacher Trainers, December 1971

The LTI held a meeting of selected teacher trainers for the purpose of discussing the LTI's study of present training activities in learning disabilities. Attending were Drs. Howard Adelman, Virginia Brown, Harold McGrady, and Doris Johnson. The results of this conference are reported in Appendix D.

LTI Activities at the Annual Council for Exceptional Children Conference, March 1972

On Division Day of the CEC Conference, the Division for Children with Learning Disabilities invited the learning disability projects funded by the Division of Services of BEH under the LD Act of 1969 to present programs to the DCLD membership. The LTI provided the morning program and personnel from selected Child Service Demonstration Programs gave presentation in the afternoon.

The LTI began with a brief introductory report accompanied by slides. The script of this presentation appears in Appendix E. Then, the audience was divided into small discussion groups on issues in the field of learning disabilities. LTI consultants, DCLD officers, BEH representatives, and LTI staff members served as chairmen for those discussion groups. Results of the discussions are reported in Appendix F.

Seminar of Scholars, May 1972

Several leaders in the field of learning disabilities were invited to participate in Seminar of Scholars. Each was asked to present a short lecture detailing their views on the present state of the art and the most urgent needs for the future. Invited participants were: Drs. James Chalfant, Norris Haring, Doris Johnson, Jeanne McCarthy, Gerald Senf, and Charles Strother. Appendix G contains a report of this seminar including a transcript of the proceedings.

Consultants, July and August 1972

Several LTI consultants were invited to the LTI to aid in the preparation of the final report. They provided quality control by reviewing report drafts and wrote recommendations for future directions of the field. Consultants who served were: Drs. Raleigh Huizinga, Eleanore Kenney, John McLeod, Patricia Myers, Robert Ridgway, and Gil Ragland.

Final Papers

Four papers have been prepared as the culmination of the LTI's survey of the field. These papers, which appear in the following sections of this report, cover four major aspects of the field of learning disabilities: (1) subject variables, (2) methods and materials, (3) personnel training practices, and (4) administrative and service arrangements.

SUBJECT VARIABLES:

DEFINITION, INCIDENCE, CHARACTERISTICS, AND CORRELATES

N. Dale Bryant

with

James A. McLoughlin

August 1972

The variables that characterize subjects with learning disabilities, depend upon the definition used for selecting subjects and in turn provide a type of empirical definition of the disorders. The different types of disabilities as well as the many diverse characteristics exhibited by children with the same apparent disability makes for great variability in measures reflecting the disability and in factors associated with them. Besides the variables identifying and defining each disability, no specific characteristic is always associated with the disorder, however there is a significant probability of common characteristics which is suggestive of some common variance among most learning-disability children. A consideration of common variance among different types of learning disabilities will be discussed later.

TYPES OF SUBJECT VARIABLES

There are many different types of subject variables. It is important not to confuse correlates with causes.

1. Some of the measures are direct symptoms of the specific disability (e.g., poor achievement in recognizing sight words will be a usual symptom of a reading disability. Inability to learn within normal limits on a trial teaching of sight words using various methods will be a direct measure of this type of learning disability in reading).

2. Some variables are possible causes of the disability:

   a. Some causes reflect the possible events that resulted in the disability and these are commonly classed as etiology (e.g., prematurity resulting in brain dysfunction, evidence of genetic factors, etc.).

   b. Other causes which by themselves are not sufficient to cause the disability can, however, clearly contribute to the severity or the perpetuation of the disability (e.g., anxiety not sufficient to block learning by itself might prevent a child with some dysfunctioning from compensating or of using the limited learning skills he still retains. Obviously, poor teaching or instruction not suited to the child's abilities can also perpetuate a disability).

   c. The most direct causes are the specific dysfunctions in the basic learning skills (e.g., confusion about left and right, or discriminating b from d and was from saw would generate some disability in learning).

3. Some variables are the result of the disability (e.g., poor self-concept and feeling of failure may result from the child's inability to learn). This is a particularly complex type of variable since a resultant can become a contributing cause, (e.g., the fear of failure and feelings of inadequancy resulting from a disability may in turn interfere with remediation of that disability and thus perpetuate it. Another example is that the lack of reading practice which might result from a reading disability, can in turn prevent the development of automatic perceptual discrimination of letter combinations which can in turn contribute to the reading disability).

4. Some variables are not a characteristic, a cause, or a result of the disability, but are still correlates of it, in that they are associated with

the disability to some degree. Correlates can occur when some basic dysfunction generates both the disability and the correlated variable (e.g., neurological dysfunctioning may interfere with the learning of reading skills and also may be reflected in motor clumsiness. This does not imply that clumsiness is necessarily a cause or result of the learning disability). The factors causing the learning disability may occur more frequently under particular conditions. If the learning disability results from a neurological dysfunction that was generated by prematurity or prenatal complications, then those conditions which are associated with greater frequency of prematurity like low socio-economic status or being black may be correlated with learning disability. A complicating circumstance is that if the neurological dysfunction or even unrelated cultural factors caused the premature child to do poorly on intelligence tests, he may be excluded from the category of learning disabilities and this would reduce the size of the correlation between prematurity and learning disbbilities.

The classification of subject variables into these categories is subjective but such categorizations provide a useful way of examining the characteristics of children with learning disabilities.

RELATION OF SUBJECT VARIABLES TO DEFINITION OF LEARNING DISABILITIES

One of the major determinants of subject variables is the definition used for learning disabilities. There is wide acceptance of the definition suggested by the National Advisory Committee on Handicapped Children, January 31, 1968, and this has been enacted into some federal and state laws:

> Children with special learning disabilities exhibit a disorder in one or more of the basic psychological processes involved in understanding or in using spoken or written languages. These may be manifested in disorders of listening, thinking, talking, reading, writing, spelling, or arithmetic. They include conditions which have been referred to as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, developmental aphasia, etc. They do not include learning problems which are due primarily to visual hearing or motor handicaps, to mental retardation, emotional disturbance or to environmental disadvantage.

In spite of the acceptance or at least lip-service paid to the above or similar definition, differences in interpretation of terms, variation in criteria for degree of severity accepted for a disorder, and the lack of operational measures of actual learning ability to implement the definition allow very different populations to be identified as learning disabilities. In the literature, in the views of experts, and in the practices in schools there are wide differences in the meaning of the term. Even beyond the variability of those accepting the Advisory Committee definition, there are many in the field who criticize the energy, time, and resources wasted on classification and would prefer to use the term learning disability for any child with a learning problem. Dealing with a problem without classification has great practical value in the school where all children with learning problems must be served. The term educationally handicapped is becoming widely used for this more general learning problem area, but some leaders in the field as well as many practitioners regard learning disabilities as synomomous with underachievement.

MINIMAL BRAIN DYSFUNCTION AND UNDERACHIEVEMENT AS BASES OF DEFINING LEARNING DISABILITIES

The field of learning disabilities was generated by two major forces. These still exist within the field to produce the extremes in definition. One force was the work on minimal brain damage or minimal brain dysfunction, which arose from medical and educational cases that were obviously impaired in neuropsychological functioning. One of the most common characteristics of minimal brain dysfunction was a disability in learning that could not be explained by other special education categories. In a major review of the term minimal brain dysfunction, Clements (1966) provided the following, generally accepted definition of syndrome:

> The term 'minimal brain dysfunction syndrome' refers in this paper to children of near average, average, or above average general intelligence with certain learning or behavioral disabilities ranging from mild to severe, which are associated with deviations of function of the central nervous system. These deviations may manifest themselves by various combinations of impairment in perception, conceptualization, language, memory, and control of attention, impulse, or motor function.
>
> Similar symptoms may or may not complicate the problems of children with cerebral palsy, epilepsy, mental retardation, blindness, or deafness.
>
> These aberrations may arise from genetic variations, biochemical irregularities, perinatal brain insults or other illnesses or injuries sustained during the years which are critical for the development and maturation of the central nervous system, or from unknown causes.
>
> The definition also allows for the possibility that early severe sensory deprivation could result in central nervous system alterations which may be permanent.
>
> During the school years, a variety of learning disabilities is the most prominent manifestation of the condition which can be designated by this term.

Early definitions of learning disabilities had a similar tone. Myklebust (1963) used the term psychoneurological learning disorders and defined it as:

> . . . we use the term 'psychoneurological learning disorders' to include deficits in learning, at any age, which are caused by deviations in the central nervous system and which are not due to mental deficiency, sensory impairment, or psychogenecity. The etiology might be disease and accidents, or it might be developmental.

The severely handicapped cases referred to by these definitions were usually thought to represent a small percentage of all school children, and they required instructional procedures that were generally unavailable in a regular classroom. These are clearly learning-disability children and many experts in the field would currently limit the term to this smaller group.

The second major thrust in developing the field of learning disabilities was the concern by educators and parents over the much larger number of children who were underachieving where the difficulty could not be explained on the basis of other recognized handicapping conditions. Since minimal brain dysfunction is usually inferred partly from underachievement, a larger number of cases began to be classified as MBD. The term learning disabilities as a label was more palatable to parents than minimal brain dysfunction. The new term relieved the physicians, psychologists, and educators who were troubled over using a medical term for behaviorally-determined conditions. It encouraged the educator to remediate the difficulty rather than assume it was a neurological condition that could not be changed. Bateman (1965) typified this underachievement definition emphasis, without eliminating the basic disorder in the learning process when she defined learning disabilities as:

> Children who have learning disorders are those who manifest an educationally significant discrepancy between their estimated intellectual potential and the actual level of performance related to basic disorders in the learning process, which may or may not be accompanied by demonstrable central nervous system dysfunction, and which are not secondary to generalized disturbance or sensory loss.

Myklebust defines learning disabilities operationally (Myklebust and Boshes, 1969) as children with an IQ of 90 or above whose Achievement/Expectancy ratio yield an IQ=84 or below. He considers a Learning Quotient of 85-89 as borderline.

The Northwestern definition (1967) stressed not just the underachievement but the need for special remedial techniques:

> Learning Disability refers to one or more significant deficits in essential learning processes requiring special education techniques for remediation.
>
> Children with Learning Disabilities generally demonstrate a discrepancy between expected and actual achievement in one or more areas, such as spoken, read, or written language, mathematics, and spatial orientation.
>
> The Learning Disability referred to is not primarily the result of sensory, motor, intellectual, or emotional handicap or lack of opportunity to learn.

With the broader acceptance of underachievement as the major criterion for learning disability the number of children so classified increased and the concern with neuropsychological functioning in basic learning processes grew less. However, no definition has ignored the learning process difficulty that separates learning disabilities from the results of poor or missed instruction. In the schools where there were practical problems of serving the underachieving children, the broader definition became widely used with severity of underachievement sometimes being the only criterion. It is likely that among these underachieving children there are many with varying degree of neurological dysfunctioning. However, there may be other factors including inappropriate instruction that contribute to the underachievement.

Neuropsychological Orientation to Learning Disabilities

Subject variables must be interpreted in terms of the two major forces in learning disabilities. Although the literature does not allow for an accurate classification of definitions in most of the articles on learning disabilities, we can sometimes identify the subgroup that utilizes the term minimal brain dysfunctioning and examine the characteristics associated with this definition before going on to examine the additional characteristics included when a broader, underachievement definition is used. Clements (1966) has summarized the characteristics reported in the literature as symptoms and signs associated with minimal brain dysfunctioning and suggests that recognition of clusters that define clinical entities (e.g., hyperkinetic syndrome) as subcategories within minimal brain dysfunction would facilitate classification in development of appropriate management and educational procedures. He reports that the ten most cited characteristics in order of their frequency are:

1. Hyperactivity
2. Perceptual-motor impairments
3. Emotional lability
4. General coordination deficits
5. Disorders of attention (short attention span, distractibility, perseveration)
6. Impulsivity
7. Disorders of memory and thinking
8. Specific learning disabilities: (reading, arithmetic, writing, spelling)
9. Disorders of Speech and Hearing
10. Equivocal neurological signs and electroencephalographic irregularities

Since specific learning disabilities are only eighth in the list, it is clear that minimal brain dysfunctioning could exist without being accompanied by a learning disability. However, in practice, it is the learning disability that creates the concern about minimal brain dysfunctioning children and usually generates the identification of the child. All of the ten characteristics listed above have been reported in studies of underachievement where the focus is not on minimal brain dysfunctioning. However, in many studies of underachievement no mention is made of the nine characteristics other than learning disabilities. This does not necessarily mean that they are not present and frequently no consideration is given to other behavioral characteristics.

The conceptualization of learning disabilities as a disorder in neuropsychological functioning as well as notes on the history of the area, approaches used, and a general summary of empirical findings are reported in material prepared by Dr. Homer Reed on Brain Behavior Relationships and Learning Disabilities. This paper is presented Appendix J. General points of view from the field of neuropsychology are represented in the following excerpts.

> . . . intellectual and educational problems are frequently associated with other health-impairing conditions and especially with conditions suggesting involvement of central nervous system functions.
> The work in genetics and particularly the investigation in public health and epidemiology combine to form a rationale for viewing intelligence and learning ability in a biological context and as partial expressions of the total health status of the child. The implications of this viewpoint for intervention strategies are that such strategies should be comprehensive in scope, focusing on multiple factors known to be inimical to health. It is necessary, however, to be much more specific. The classroom teacher is faced with the responsibility for accomplishing highly specific tasks with individual children. It is difficult for the teacher to utilize, in any focused manner, knowledge of the social-biological context in which learning disabilities occur. Furthermore, there are many learning disabled children whose health status seems otherwise intact, whose families appear intact, and who appear not to have been victimized by oppressive environments. For such problems the biological frame of reference must be transformed into specific ways of understanding, managing, and helping the disabled child. The necessity for such a transformation is not unique to problems in special education any more than the growth and development of handicapped children is solely the responsibility of special education personnel. Such responsibility must clearly be shared between personnel in education and personnel in selected fields of medical practice. The neurological sciences are specifically relevant to problems in education. Children with learning disabilities are disordered in their brain-behavior relationships, and specific procedures for understanding brain-behavior disorders form the material for the following section. . .
> . . . The common theme which unites the clinical investigations of brain-behavior relationships is the search for regularities in the effects of brain lesions on the basic adaptive abilities which human beings possess. [Comprehensive reviews of this area of inquiry have been written by Teuber (1955), Reitan (1962), Birch (1964), and Yates (1966)]. This clinical search has at least prima facie relevance for the problems in special education which are presented by children with brain-behavior disorders. For this reason it is appropriate to present a capsule statement of major substantive findings and also to note certain critical limitations in our knowledge.

1. Brain lesions typically (but not invariably) result in both generalized and specific impairment of abilities. Another way of stating this is that certain abilities (notably, abstract thinking) appear to be diffusely represented in the cerebral cortex, whereas others (e.g., speech, specific motor and sensory skills) have quite specific representation.
2. The specific effects of brain lesions appear to be primarily related to the location of the lesion, but these effects may not appear if the lesion is incurred pre-natally or very early in life. For example, speech and language usually show specific adverse effects from lesions involving the left temporal lobe. Massive left cerebral hemisphere lesions incurred very early in life, however, usually result in generalized retardation rather than in specific speech and language problems.
3. Certain types of abilities appear to be more vulnerable than others to the influence of brain lesions. This may be related to how these abilities are represented in the cerebral cortex (see #1 above). Cattell (1963) has identified two broad groups of abilities which he has labeled as "fluid" and "crystallized" abilities. This classification seems to correspond to Reed's (1963) "immediate, adaptive abilities" versus "stored memory" continuum. Brain lesions appear especially to affect fluid intelligence or basic problem solving strategies as compared to stored memories or highly specific skills.
4. The effects of brain lesions change over time. Measurements taken shortly after a lesion has been incurred may reveal quite different effects from measurements taken months or years later. The changes may reflect continued development of the individual following the brain insult, a differential rate of recovery, or a combination of both factors. Changes in the effects of brain lesions are thus related to the type of lesion, the condition of other parts of the cerebral hemispheres, the age of the patient, and methods of investigation.
5. As an extension of the preceding point, brain lesions in children appear to have effects which may differ substantially from the effects of brain lesions in adults. This generalization is subject to so many limitations, however, that its usefulness must be seriously questioned. It has not yet been possible to do comparative research studies which adequately control such variables as lesion type and location, lesion duration age of patient at time of injury, etc. For a discussion of the problem, see Reed and Fitzhugh (1966). However, the recent research of Boll and Reitan (1972) and the massive project of Myklebust and Boshes (1969) suggest that the relative importance of quantitative versus qualitative effects may be different for adults than for certain groups of children, especially those now designated as "minimally damaged."

The significance of the five major substantive findings discussed above is difficult to evaluate both from a scientific and a utilitarian point of view. The scientific quality of our knowledge of the effects of brain disorders in human beings is sharply limited by the absence of sampling procedures, by the variable availability of neurological criterion information, and by the relative absence of longitudinal research. The utility of the substantive findings discussed above is limited in the same way that most generalizations involving the behavioral sciences are limited. For a particular individual the statistical procedures used to arrive at the generalizations may conceal more information than they reveal. Such procedures overlook intra-individual variability, and this may be the essence of understanding the individual patient. Fortunately, for utilitarian purposes, there is some basis for believing that we may know more than the broad generalizations suggest. . . . . . The inclusion of norm-referenced mental and motor tasks in a comprehensive neurological examination creates special problems. The relationships between such tasks and other investigative procedures in the neurological sciences must be carefully established. In the traditional view of the world of brain-behavior relationships, "brain things" have been conceptualized quite differently from "behavior things," this distinction being expressed in the traditional classification of independent and dependent variables. Erasing this distinction may result in conceptual confusion, but it also fosters an integration between medical science on the one hand and educational and behavioral sciences on the other.

The conceptual confusion can be clarified by research exploring the relationships between the traditional neurological investigative procedures and the "new look" which emphasizes the usefulness of measures of mental abilities. Fortunately, this "new look" is not new to the behavioral sciences, there being a distinguished tradition of research emphasizing psychological tests in assessing the consequences of brain dysfunction. A summary of this research follows.

The use of psychological tests in investigating the effects of brain damage on human abilities is an area of work that forms a bridge between the neurological sciences and the behavioral sciences and that has important implications for educational practice. Most of the systematic work has been done with adults, and good surveys of the literature are available [e.g., Reitan (1962), Yates (1966)]. A comparable body of knowledge on the effects of brain damage in children is not yet available, but promising efforts are certainly being made [e.g., Myklebust and Boshes (1969), Deutch and Schumer (1970)]. It is not here the intent, however, to summarize the empirical studies, but rather to emphasize two kinds of methodological contributions which are judged to be of special importance. The first of these methodological contributions relates to the appearance of test batteries designed to be specifically sensitive to the organic condition of the brain and which permit the employment of a variety of interpretative procedures. It is generally true that psychologists have been guilty of over-simplifying problems in brain-behavior relationships, using a single test approach which does justice neither to the complexity of the brain nor the complexity of behavior. The behavioral manifestations of brain damage are fully as numerous and complex as conditions which adversely affect brain functions, and the use of a single test to explore the effects of brain damage are fully as numerous and complex as conditions which adversely affect brain functions, and the use of a single test to explore

> the effects of brain damage denies this basic premise. For example, brain lesions may result in generalized impairment of abilities, they may result in highly selective impairment (e.g., impairment limited to language skills), lesions may differentially influence sensory-motor functions on the two sides of the body, they may generate pathognomonic signs, etc. Only by using a comprehensive battery of tests can one do even approximate justice to the problem. For full discussion and illustrations of this problem, see Reed (1971).
>
> A second important methodological contribution is reflected in studies demonstrating the use of psychological test results with individual patients. The great bulk of research investigating brain-behavior relationships in human beings has focused on comparing groups of brain-damaged patients with control groups. Such studies have limited applicability to problem situations in which the individual subject or patient is the only meaningful unit. Crinella and Dreger (1972), Knights and Watson (1968), and Reitan (1964) have discussed this problem in detail and have proposed and demonstrated solutions for it. It is sufficient here to note that well-trained personnel using appropriate psychological tests can draw specific conclusions about individual patients. Because of the environments in which these investigators have worked, the kinds of conclusions drawn about individual patients have typically related to neurological variables. If the capability for understanding the single brain-damaged subject is to be applied to educational problems, then the locus of research must change from the hospital and clinic to the school. . .

Much of the literature on learning disabilities and minimal brain dysfunctioning emphasizing these problems has come from medical sources. Pediatricians, psychiatrists, and particularly neurologists have contributed to the conceptualization of learning disabilities as a neuropsychological disorder. A summary of Neurological Factors in Learning Disabilities: A Review of the Nature of Present Contributions of Neurology and Appraisal of Future Research Needs from a Neurologist's Point of View was prepared by Martha Denckla, M.D. Associate in Neurology, Columbia University, College of Physicians and Surgeons and is presented in Appendix H. General points of view from the field of neurology are represented in the following excerpts.

> The classical neurological examination yields most precise information about brain localization and specific brain disease when applied to clear loss of function of a subcortical nature in a previously normal adult. In such cases, post-mortem anatomical confirmation of function-structure relationships is available. But the neurologist is in quite another situation when confronted with the child who has not met a scheduled criterion of learning a skill presumed to be dependent upon higher cortical function. For these cases, no anatomical confirmation of localization is forthcoming. Has the neurologist anything to offer at the present? What could we expect to gain from research by a neurologist in the future?
>
> In reviewing recent textbooks of neurology, one finds increasing numbers of pages devoted to irregularities of neurological

functioning which a decade ago were considered to be in the realms of psychiatry or clinical psychology, but which are now collected together under the broad title of "minimal brain dysfunction." The history of the development of this term and its broad range of meanings is reviewed in the reference list at the end of this paper. From the neurological textbook point of view, however, these irregularities are worth noting either because they may be the initial or the peripheral signs of a more serious neurological condition, or because they serve to alert referring educators, psychiatrists, or psychologists that there is "something organic" about the patient; rarely is the orientation one of trying to make syndromes of irregularities which correlate with specific behavioral complaints. The irregularities are listed as "soft signs," and it is noted that these occur along with "hard signs" in patients with known, specific, definable neurological diseases; the inference often drawn is that the "soft" (usually neuropsychological) signs are the result of "diffuse" but minor brain pathology. If the child's history indicates that he has been at risk perinatally or later of having suffered some physical insult statistically correlated with brain damage, this increases the neurologist's confidence that the "diffuse soft signs" and the behavioral complaint are related.

These general concepts which yield a diagnosis of "Minimal Brain Dysfunction, manifested by __________" are now becoming so widely known that competent pediatricians are able to screen most such children and medicate them with the widely publicized stimulants. Why, then, are so many such children still referred for neurological examinations?

The present writer thinks it is because other professionals are looking for something more from the neurologist, who is trained in a tradition of dissection of observations, a concern for specifics rather than complexes of behavior. Although this habit of analysis has been more fully developed in diagnoses involving subcortical systems, there has been a recent resurgence of interest in cortical or "higher cerebral" systems, with a gradual replacement of the semi-philosophical "faculty psychology" terminology of a previous generation of neurologists by a task-analytic terminology. Interest in the concept of disconnection syndromes and in the effects of stereotactic surgery has brought back localizationism in a modified form, so that younger neurologists think in terms of critical circuits or loops of connections rather than "centers." On the other hand, there is less tendency to regard loss of higher integrative function as simply mass-related, or "diffuse."

Two sources of data and technique become important for this sort of modern neurologist. One is the body of data provided by neuropsychologists about the adult with known localized brain damage. Constellations of "soft signs" repeatedly correlated with certain lesions thereby "graduate" to the status of "hard" syndromes in adults, and the neurologist looking at children may proceed to ask, "Do I see an analogous constellation in children?"

> The second source of input to the modern neurologist is the wealth of child development data accumulated by pediatricians, psychologists, language pathologists, and special educators. Only with this data can we judge a given child to be impaired on a task which we have "borrowed" from investigations of adults. We cannot form clusters of impairments from which to infer cerebral mechanisms unless we can define for each task *what* is considered impaired for a child of a given age. We *can* also use these data to define developmental disorders as those in which there is performance of a given task at a level below the child's chronological age and below his own performance levels in other tasks. (This is in distinction to disorders which are deviations from *any* behavior *ever* seen at any time on a developmental continuum.)
>
> The neurological examination of the child referred with learning disabilities can, even at this stage of knowledge, make use of the classical neurological dissection of observed behaviors into specific components. It can then use for comparison developmental schedules for neuropsychological tasks in normal children. And it can then bring in knowledge of the clinical-anatomical or physiological correlations known to exist in adults with syndromes of analogous "soft signs." The neurological examiner then states as facts any specific neurological indicators (on the normal continuum, but below the child's age level), and the child's personal physical and family history. He searches for a "pattern match" in the known adult syndromes. If this is negative, he falls back upon a strictly phenomenological "pattern match search" through previously seen and described childhood cases. It is this writer's hypothesis that the neurologist is more useful to other professionals when he is able to suggest, even by analogy, relationships between childhood and adult syndromes, particularly when these share the same behavioral complaint. Lost in the list of childhood signs, we are forced to admit that there is no cluster which at present predicts or explains any specific behavioral complaint. . .
>
> . . . In conclusion, it can be seen that the neurological approach suggested above resembles a microscopic examination, starting from a low power scan of the entire field (analogous to finding "something organic" in history and physical findings) to middle power (writing "manifested by language disorders," e.g.) to high power (delineating a specific syndrome or profile). Although localization in the traditional sense is not a reasonable goal, utilization of analogies and critical differences between childhood and adult syndromes sharing similar complaints brings us closer to a clinical classification scheme. At this stage of exploration of learning disabilities, or minimal brain dysfunction syndromes, the neurologist seems to be in a position to help make order out of what sometimes seems like a mass of endless individual variations.

Probably the most comprehensive review of research in the general area of neuropsychological dysfunctioning resulting in LD is the National Institute on Neurological Dysfunctioning and Stroke Monograph #9, *Central Processing Dysfunctions in Children* by Chalfant and Scheffelin (1969). While these authors are educationally-oriented and are not utilizing the term minimal brain dysfunctioning, the focus on central processing dysfunctions is clearly within the thrust generated from the field of minimal brain dysfunctioning. While this state of the art paper will use material from this monograph, no attempt will be made to duplicate the several years of work that have gone into the review of the literature and instead it is assumed that any reader concerned with this field will have recourse to this basic reference.

Underachievement Orientation in LD

The other major thrust in the definition of learning disabilities differs from the MBD-Central Processing Dysfunction-Neuropsychological Dysfunctioning thrust in that it is oriented primarily toward practical educational concerns of underachievement and treatment.

Underachievement obviously due to sensory defects or to mental retardation is excluded but the presence of emotional disturbance or disadvantaged background are hard to identify as primary causes of the learning problem, so these conditions are sometimes excluded or judged to be related but not primary. Treatment of the learning problem is often the same regardless of emotional problems or disadvantaged background (or even educable mental retardation when a disability exists in addition to the lower general ability) and in these cases it seems reasonable to many LD personnel to deal with cases on the basis of a learning disability. Frequently in clinical work but seldom in research studies, the child will be given learning trials to determine if the problem is truly a disability or is a lack of learning for other reasons. It is quite possible that the disability is specific to methods that have been used in teaching. Chall (1967) suggests that cases of reading disabilities in classes using the whole word approach might be different children if the class had been taught with a phonetic or linguistic approach. Hammill (in personal communication) reports that the majority of children coming to resource rooms set up by Temple University are able to learn by the same method on which they had previously failed. This suggests either (1) that the underachievement was related to attitudinal and motivational factors, (2) that the dysfunctions that had originally resulted in a disability had been overcome by maturation or similar factors, or (3) that the learning disability was based on factors in instruction which were compensated for in the reteaching (e.g., difficulty in abstracting the element to be learned from the complex presentation usually used in class, lack of sufficient practice to learn each element to an automatic level, the absence of teaching for integration of skills and transfer to more complex tasks). Bryant (1964) and other authors have suggested that the need of more focused instructional procedures are at the basis of many LD's. Probably all three reasons are the bases for different cases of underachievement and perhaps a blend of several is the basis of underachievement in many specific cases.

The practitioners working with cases of LD defined primarily by underachievement are often concerned with dysfunctions, not so much as a basis of classifying cases as LD but as a basis for treatment planning. Thus the difference between the MBD orientation and the unexplained underachievement focus in defining LD is a matter of degree.

MEASURES OF EXPECTED ACHIEVEMENT

Concern with underachievement focuses upon the measures of achievement and the measures of expectation that are used. Most often the expectation indicates that the cases are either not mentally retarded or that they are of normal intelligence (usually substantiated by a statement that all cases have 80 or 90 IQ or above on some standard intelligence test). Children with average performance in spite of high intelligence are seldom considered as learning disabilities in the literature. Learning beyond instruction is not deemed necessary. However, a high IQ child in an accelerated school program who achieves only at a level appropriated for his age and grade but below his classmates may be listed as a learning-disability case in some studies.

Performance in other learning skills compared with the deficient skill is sometimes used as an indication that the learning disability is not general. However, the tendency for a child with one disability to have others complicates this procedure. Similarly the relatively low correlation between some basic skills such as beginning word recognition and IQ makes it difficult to deal precisely with achievement vs potential questions. Quotients using several indices of potential ability have been suggested by Myklebust (1968), Monroe (1932), and others.

Use of listening comprehension to compare with reading comprehension (e.g., Durrell, 1969, Sequential Tests of Educational Progress, 1958) is a promising approach for reading disability since it aids differentiation of the reading from general comprehension problems. Of course, when a general comprehension disability is present, another measure of expected performance must be used.

Because of all these complexities with the concept of potential, the common use of "normal intelligence" or "not mentally retarded" is probably a useful solution to the problem of differentiating a learning disability from a general disability in most intellectual functions. Many learning disability specialists suggest that a learning disability in the presence of MR, ED, Physically Handicapped, etc. is still a learning disability and that the treatment should be for the learning disability as modified by his other handicaps. This broader use of the term learning disability will be discussed later. Reed (Appendix J summarizes some of the concepts and research related to the concept of "reasonable expectation" in defining underachievement:

> The concept of 'reasonable expectation' and from what sources expectations are and can be generated are viewed as critical problems for the education of the learning disabled child. It is to these ideas that the materials which follow is addressed. The empirical basis for what is reasonable to expect from children in school lies in the almost countless attempts, during this century, to measure and to elucidate the nature of intelligence. Moderate success can be claimed for the effort to predict school success under conditions of routine classroom instruction from intelligence test scores. This relationship is clearly useful in helping to identify certain groups of handicapped children (e.g., the mentally retarded), and it may be of value also in making preliminary judgments regarding the probable attainability of certain educational goals. For many of the problems in educating handicapped

children, however, intelligence test performances have little relevance. Teachers cannot select teaching strategies on the basis of IQ scores, specific kinds of difficulties cannot be predicted from IQ scores, and the teacher of learning disabled children is hardly the wiser for knowing that her youngsters "should" have been successful in the regular classroom environment. Learning disabled children, by any generally accepted definition, are children whose intelligence test performances far exceed in adequacy their performances in school tasks. Thus, while intelligence test scores can be useful in helping to identify learning disabled children, our understanding of these children is not thereby increased. It is necessary, at this point, to distinguish between intelligence and intelligence test performances. Unless one's thinking is limited to operational definitions, it is an offense against common sense to insist that children who are obviously impaired in learning ability have normal intelligence. Such children clearly are selectively impaired in their basic adaptive abilities, and it is only because intelligence tests include a relatively restricted sample of behavior that they fail to reflect such impairment. The development of frameworks which might permit a more adequate conceptualization of intelligence will surely aid our understanding of the learning disabled child. The intelligence testing movement does not provide such a framework since this movement has remained largely uninfluenced by theoretical considerations other than those deriving from work in statistics and measurement. Thus, concern with the structural properites of intelligence tests has, until recently, overshadowed concern with factors influencing the development of intelligence.

Frameworks within which the concept of intelligence is considered have traditionally focused on the normal child, emphasizing the interplay between genetic and environmental forces in determining abilities (e.g., Burt and Howard (1957). Burt (1958), and Jensen (1968). Educators have responded differentially to investigative efforts, seizing upon those findings which have illuminated the importance of social-cultural determinants of intelligence and ignoring work of equal scientific merit emphasizing the primacy of genetic factors. Thus, differential responsiveness has been reinforced by the broader cultural zeitgeist emphasizing the importance of correcting such social ills as poverty, joblessness, racial discrimination, etc. Throughout this social-educational fabric, there seems to be the unspoken fear that biology may prove to be a force which is inherently inimical to social progress, human welfare, and quality education. The absurdity of this fear is equalled by the magnitude of its deleterious effects--the failure to design social and educational systems whose effectiveness depends on adequate recognition of biological factors. The investigative work referred to above focuses on biological and cultural factors in normal development. More directly relevant to problems in special education is work focusing on the development of deviations that form the challenges of special education. There are three principal bases of inquiry-genetics, public health, and epidemiology, and the neurological sciences.

A comprehensive survey of work focusing on the genetic foundations of intelligence is provided by Jensen (1969). The critical points elucidated in this article are as follows:

1. Genetic factors are of much greater importance than environmental ones in influencing intelligence.
2. Knowledge of the role of genetic influences is clearly inadequate as a basis for counseling or educational planning on an individual basis.
3. Certain kinds of intellectual abilities are more influenced by genetic factors than others. Specifically, "abstract reasoning" and capacity for "insightful" learning are more clearly tied to genetic factors than "associative" learning.
4. Although most educational programs are designed to offer maximum opportunity for abstract reasoning and insight, it should be possible to design programs to achieve critical behavioral competencies which at the same time will diminish the disadvantages in which genetic factors normally result.
5. It is unreasonable to design (or to evaluate) educational programs using intelligence as a principal criterion variable. It is suggested that acquisition of specific skills is a more useful criterion variable.

The context for the above points is the indifferent success of the many compensatory educational programs designed to counteract the alleged influence of culturally impoverished environments on the educational aptitudes of young children. It is important to remember that the heritability of intelligence is not an argument against early education, but rather that the design and intent of such programs should reflect the characteristics of the children for whom the programs are intended.

ARTICLES REVIEWED

In examining articles for subject variables, the definition of the sample is usually not clear and even when the description of the sample is very explicit, the definition of learning disabilities may vary greatly from one study to another. In examining the literature it was necessary to review studies which deal with children called learning disabilities or that deal with those who can be subsumed under that category. (E.g., reading disabled, aphasic, brain damaged). A broad and rather vague definition of learning disabilities found in the literature perhaps reflects the developmental stage of the field, when many of the articles predate general usage of the term learning disabilities, and where the broad definition is not incongruent with the operational definition being used in educational and clinical practice. The trend in education has been toward the including of all children with educational handicaps and away from the narrower definition that focuses upon dysfunctioning in basic learning processes. Perhaps some of the same factors that cause educational services to be oriented toward broad definition of those children with difficulties also cause the research to be equally wide and diffuse. The fact that many researchers are primarily engaged in educational service and often do their research as a description or evaluation relating to their educational practice contributes to the present emphasis on broadly defined educational groups and procedures rather than laboratory type explorations where the group is selected to fit a predetermined definition.

Whether the term "learning disabilities" is used or not used in articles that are discussing cases and problems that can appropriately be subsumed under the topic "learning disabilities", the definition of the handicapped group seems to be one of underachievement in some basic skill area--most commonly reading, and the term reading disability or dyslexia is often used with this underachievement definition. Underachievement is usually defined either by an achievement/expectancy quotient or more frequently by one-and-a-half to two years retardation of achievement behind age or grade for children of normal intelligence. Sometimes children are selected on the basis of teacher identification, on inclusion in a class for the learning disabled or perceptually impaired or the educational handicapped, or from children coming to a particular clinic. Some studies indicate that the children would not fit in the other special education categories. However, in a considerable number the reader is left with the impression that borderline intelligence, behavioral problems and poor teaching may have contributed to the selection of cases even though underachievement is the primary determinant.

Most studies are descriptive or correlative. There is little experimental research in the literature. There is an unfortunate tendency for correlative results to be interpreted as if they imply cause-effect, and indeed, many treatment studies are based upon these findings, (e.g., perceptual motor training being used because of the correlation between perceptual motor ability and early reading achievement).

Few theoretical papers deal with models of learning disabilities with the exception of models that are implicit in the construction of a test (e.g., ITPA). Few studies derive and test hypotheses from theoretical models. There are, of course, exceptions including the work of Deutch and Schumer (1970), Birch and Belmont (1965 b), and various studies related to Osgood's model. A model of learning disabilities is crucial to the development of this field and many research studies in related fields have brought work in attention, information processing, and learning to the point of theoretical formulations useful to learning disabilities. Some investigators (e.g., Dykman et al., 1971) have suggested that specific learning disabilities can be explained as an attentional deficit syndrome. The development of theoretical formulations was judged to be so important for the future of the field, that for the inclusion in this state of the art paper on subject variables, Dr. Gerald Senf was commissioned to review and summarize these developments. Dr. Senf has gone beyond this and brilliantly synthesized existing research and hypotheses with his own theorizing to develop a basic model for Information-Integration theory that is directly applicable to understanding learning disabilities. The entire paper, An Information-Integration Theory and Its Application to Normal Reading Acquisition and Reading Disability is presented in Appendix K. His introductory comments clarify the need for and the problems with theories applied to learning disabilities.

In order to understand abnormal functioning, it would be useful to have a theory substantiated by experiments which describes the course and functioning of normal behavior. Such a theory together with its supporting factual data would allow us to understand precisely where abnormality is centered. By examining the functioning of the person thought to be disabled in some way, we would be able to decipher where his performance varies from that of the normally functioning individual. Such performance differences would imply within the context of the theory processes or systems which are functioning irregularly. These processes or systems would then represent the focus of one's remedial effort.

It should be clear why a theory is necessary in this endeavor and that a collection of unorganized facts will not suffice. Most basically, one need recognize that there are an endless number of data points that one could collect that would discriminate between any two samples of persons. Understanding deviant functioning or any functioning for that matter proceeds not simply by having a large collection of data but by having those data organized into a coherent framework. A framework allows some data to take on more importance in understanding the disability than others by specifying the manner in which the data are related to each other.

Besides the basic function of organizing facts into meaningful relationships, theory is particularly important in understanding deviant functioning.

To be recognized as meaningful deviant functioning, behavior need be abnormal in a manner which has profound consequences for the individual and likely also for his family and more broadly for society in general. The deviance, thus, ordinarily involves a large segment of the person's life. As such, the disability creates many differences that are not etiological or otherwise basic to the disability itself. Said most simply deviance seems to breed deviance such that the individual given an abberrant manner of behaving tends to have this deviance affect many aspects of his life. Consequently, there are an endless number of ways in which the deviant individual differs from a person not so afflicted. The need for a theory is seen in the necessity to organize the atypical behaviors into a coherent, meaningful pattern. Without a theory, the enumeration of deviant behaviors goes on unchecked, resulting in a proliferation of constructs which complicate rather than illuminate our understanding. Without a theory, the constructs are frequently heavily overlapping and as such terribly redundant. Furthermore, the body of constructs has no specified relationships between one another. Hence, the deviant individual is thought to have a multitude of problems where an appropriate theoretical conception may show him to have only one basic problem with performance in other spheres aggravated by this specific deficit.

Recently, the area of learning disabilities, with which this paper is primarily concerned, has gravitated toward constructs familiar to information-processing psychology in lieu of the medical terminology which had not proven educationally meaningful. Terms such as selective attention, visual discrimination, auditory discrimination, visual perception, visual-motor functioning, sound blending, and the like cast the disabled learners' deficits within a psychological perspective. Rather than impute to the child genetic or organic anomalies, the field has chosen, wisely I think, to describe the child's disorder in terms of those underlying processes which limit his ability to utilize language. Though information-processing models represent only one possible approach, their simplicity and intuitive appropriateness for understanding educational disabilities more than justifies their selection.

The field of special education has encountered problems with the information-processing framework, however, which stem, I believe, from an unwillingness of persons in the field to accept the interpretive restrictions which any specific information-processing model will necessarily contain. Though the information-processing terminology has been accepted, the uniqueness of competing models has been lost and with it the interpretive power and research generating potential. Consequently, the field has fallen prey to the proliferation of terms which results when a theory does not guide one's thinking. There are notable exceptions to this general state of affairs, for example the adoption of an Osgood Linguistic Model which underlies the ITPA, but this is nearly unique in its adherence to a coherent framework.

An analysis of the attentional deficiencies of learning disabled children as is being undertaken here would require that we cast attention in a specific theoretical framework. Despite the work of the last ten years or so in the field of cognitive psychology in constructing models of attention and associated processes, I find no single model satisfactory for understanding the difficulties encountered by learning disabled children. Furthermore, I find the existing models lacking in a number of other respects including their inability to account for certain germane experimental data and their severely restricted conceptualization of the information processing capabilities of the human organism. I am thus offering an alternative model which I will first describe in considerable detail and then use to analyze the information-processing difficulties of learning disabled children.

Background to the Theory: Dissatisfactions with Present Information-processing Models. My dissatisfaction with present information-processing models is in part philosophical: Viewing man as most of these models do as one who decodes sensory inputs, holds them for brief periods of time, stores some for longer term use, and then later retrieves these stored signals does not do justice to the complexity of the information-handling abilities of the human being. It is not that I seek more humanistic terms but rather wish to provide a framework within which information-processing research techniques can be utilized to study the organism's broader capabilities.

The most basic problem encountered with existing models is their insensitivity to feedback and under-representation of the organism's active role in information-processing tasks. Information-processing models typically adopt the traditional view that man's behavior (responses) is a function of environmental events (stimuli). More recent conceptions (e.g., Pribram, 1969) have stressed the importance of the organism's internal state as well as its productive capabilities in determining the particular response that will occur. Though it is widely recognized that the state of the organism will affect its dealings with the external world, it has not been easy for psychologists to build this observation into their theories. What we want to conceptualize is the notion that each behavior of the individual becomes part of its surroundings by virtue of various feedback mechanisms. Man hears what he says, feels what he does, and perhaps most importantly, has verbal awareness of his own behavior. These self-perceptions provide a more continuous cue base from which to generate behavior than that afforded by the external environment. The organism's cue base plus the stimuli impinging on him provide the context for his behavior.

In addition to the general orientation of present information-processing models, I take issue with certain more specific aspects shared by most present conceptualizations. As each of these problems will be discussed in detail below, I shall only refer to them here.

Exclusive reliance on linguistic materials. First, I think many present models generally overlook or underestimate the uniqueness of linguistic stimuli, whether presented visually as graphic symbols or auditorily as spoken speech. In relying almost exclusively on such linguistic stimuli for their experiments, psychologists have generated data and associated models which may be limited in their explanatory power to linguistic materials alone. Not only may they be limited but they may be erroneous to the extent that linguistic material has properties not shared by other kinds of information.

Our notions of attention within an information-processing context is a case in point, deriving in large part from experiments with linguistic materials. The early Cherry (1953) and Broadbent (1954) experiments together with the model derived from this line of investigation (Broadbent, 1957, 1958) led psychological researchers to ask whether attention were unitary, to be deployed totally to a given signal, or divisible, to be shared if necessary between two or more signals. This basic question about attention had distinct implications for the processing of information: Were attention non-divisible, simultaneous reception of two distinct streams of continuous speech, would not be possible. A person interested in both speeches going on simultaneously would need to switch his attention back and forth from one speech to the other. By utilizing the redundancies in speech and by carefully timing one's attention to each speech, one could grasp most of the meaning and perhaps even have the impression of having listened to the two conversations at the same time. The opposite conceptualization, that attention can be divided between two incoming signals, purports that information can be processed in parallel, that is two streams at the same time. This issue of whether attention is unified or divisible and the associated question of whether information is processed sequentially or in a parallel have occupied the time and energy of psychologists for a number of years. As I shall make clear below I think both of these are pseudo-issues, born out of a conceptualization of information-processing derived from and limited to the study of linguistic material.

Auditory decoding of linguistic material. A second problem with present information processing models is their assertion that language decoding operates through an auditory-verbal-linguistic process. It is generally held, although recent experiments contradict this notion (Parkinson, 1972), that linguistic stimuli are translated to an auditory code for storage. This is not to say that people sub-vocalize as they read or that they repeat to themselves what the speaker is saying. Rather, it says that the code in which these linguistic events are stored is the same code from which the person generates his own language. There are excellent data supporting the position that linguistic stimuli can and frequently are auditorily coded. A prime example is the research on auditory confusions by Conrad (1964) in which he has shown that errors in recalling visually presented items are more similar in sound to the correct item than in shape. The implication is that the graphemes are auditorily coded such that any intrusion errors that result are more likely to sound rather than look like the correct grapheme.

Of course, demonstrating that visual graphic symbols are frequently and under a variety of conditions auditorily coded does not assure that they always are or can only be auditorily coded. Particularly when one considers that in most psychological experiments the subject is required to recall the items presented to him else the psychologist will have no data, he may be prompted to translate visual items into the auditory code appropriate for their output. There may exist a wide variety of conditions in which a person is not so prompted to translate visual graphic symbols into an auditory representation. One such example might be in reading; the accomplished reader may be able to recognize directly the meaning of a pattern of graphic symbols without first translating those graphic symbols into their auditory representation. As recent research (Parkinson 1972) has shown that purely visual coding of graphic symbols is possible, a revised information-processing model is required.

Fragmentation. A third problem with present models which a new information-processing theory should correct is the fragmentation of information and the derived experiences that is implied by the unified notion of attention. Were we truly to pay attention to only one thing at a time, our experience and the resulting memories of those events would be terribly barren, uni-dimensional. Models which require one to pay attention to a given signal in order to process it put

> themselves in the position of being unable to account for the richness of immediate experience. Rather than accepting models which implicitly fractionate experience by requiring that channels of information be dealt with only sequentially by the organism, I think we would do better were we to tackle the issue of how to conceptualize man's tremendous ability to integrate a variety of sensory inputs. By implicitly limiting their purview to verbal stimuli (though many do not recognize this restriction) and by finding that as a result of the study with linguistic stimuli that material normally is processed sequentially, information-processing models falsely escape the issue of how under normal circumstances so much information seems to be gathered and stored as a unitary experience. An example may clarify the issue: one's walk through a garden on a spring day is not recalled as a sequence of colors, shapes and movements or the sensation of one's own body but as a total experience, a combination of these many impressions. Certainly it is possible that the combination of these sensory impressions occur sometime after their reception and that, as the present information-processing models imply, their reception was accomplished sequentially. However, this does not meet with our immediate experience. More important though our present models don't address the issue at all. As will become clear below, I believe that the integration process occurs during the reception of the events rather than after their reception in memory. Regardless of one's conceptualization of this specific issue, we do need a model which can deal with the integration of sensory events into unified experiences and memories such that researchable predictions can be made and evaluated.

LITERATURE REVIEWED

In examining the literature many sources were used including all relevant articles in the Exceptional Child Abstracts and in the Psychological abstracts (with the original articles usually being reviewed), all relevant dissertations and their survey of the literature, and the basic texts.

One type of research of vital importance to the field but not a part of it was not systematically reviewed. The basic research in areas tangential to learning disabilities and on which the field is based, was not systematically examined since this, in effect would require a review of many fields each as large or larger than learning disabilities itself. Areas not reviewed unless the implications for learning disabilities were specifically considered include such fields as:

General Education. Work in individualized instruction, precision teaching, classroom management, programmed instruction, math education, developmental reading, development of new materials, etc. could be extremely important to learning disabilities.

Special Education other than Learning Disabilities. Mental Retardation and Emotionally Disturbed have considerable overlap with learning Disabilities and all areas can contribute to the field of Learning Disabilities.

Psychology (Particularly the fields of learning, perception, memory, and general education psychology). Emotional factors in performance, the structure and measurement of intelligence, behavior modification, neuropsychology, developmental psychology all are relevant to the field of Learning Disabilities.

Language Development. Speech and Hearing (of course some areas like aphasias and language disorders are covered by the term learning disabilities).

Sociology. (Particularly socioeconomic and cultural factors influencing achievement).

Biochemistry.

Genetics.

Medical Fields (Particularly Pediatrics, Psychiatry, and Neurology).

In a sample of 500 articles that were judged to deal with learning disabilities about half deal with learning disabilities in general (aspects of disabilities not specific to a particular disability area or disabilities across all areas). Frequently these articles are opinion papers or studies on minimal brain dysfunction, memory deficits in learning, perception problem, special education techniques, hyperactivity, emotional concommitants to learning problems, descriptions of educationally handicapped classes, etc. The remaining half of the articles deal with specific areas of disabilities (sometimes two or more areas are the focus of a particular article so the following percentages will not sum to 100). In these "disability area" articles the emphasis is overwhelming in the area of reading disability with 65% of the disability oriented articles dealing with reading. In contrast only 3% dealt with handwriting. About 5 or 6% each dealt with arithmetic, spelling, written language, and thinking. Twelve percent dealt with oral expression and 33% dealt with perceptual motor difficulties.

Elementary school populations are the most commonly studied in the area of learning disabilities, even for such specific areas as perceptual motor handicaps where it was expected that kindergarten and pre-school would be the emphasis. Pre-elementary and secondary populations are sometimes used, but very little has been written about learning disabilities in adults.

The majority of articles in the field of learning disabilities can be considered as research if this is defined very broadly and loosely. About 30% of the articles are mostly opinion papers, and 17% are some kind of survey of other articles and opinions.

INCIDENCE

Incidence figures for learning disabilities in the absence of operational measures in the learning process are almost meaningless. We lack systematic studies that use direct measures of learning.

Certainly a large proportion of the children within general education show extremely low achievement in basic skills, particularly reading. The tremendous number of underachievers is illustrated by National Center for Health Statistics data. Reading tests were administered to a representative sample of 7000 children between the ages of six and eleven. Twenty-five percent of the eleven year olds read at levels two or more years below their grade placement (e.g., fifth graders reading at third grade level or below). In four to five years they learned what the average child learns in two to three years. For third and fourth grade children to be two years behind is more drastic and usually one and a half years retardation is judged to be severe. Even when using this more extreme criterion, 12% of the nine year olds read two years below grade level. This means that in the two to three years they have been in school they have remained either non-readers or have not progressed beyond first grade skills. Studies from every part of the country, including affluent, advantaged areas, report similar high rates of underachievement in reading. Reviews of other disabilities are less frequent, but underachievement is substantial.

The criteria for severe retardation in achievement is usually similar to the one used above: two years behind grade placement or in the third and fourth grade one and one-half years behind grade placement. Teachers identify these children as having severe learning problems. When a child spends four years in school and achieves only what most children of his intellectual level achieve in two years or less, it is reasonable to consider the academic retardation severe. Since many low achievers have repeated a grade because of their poor performance, the severity is often greater than it seems from the child's grade placement.

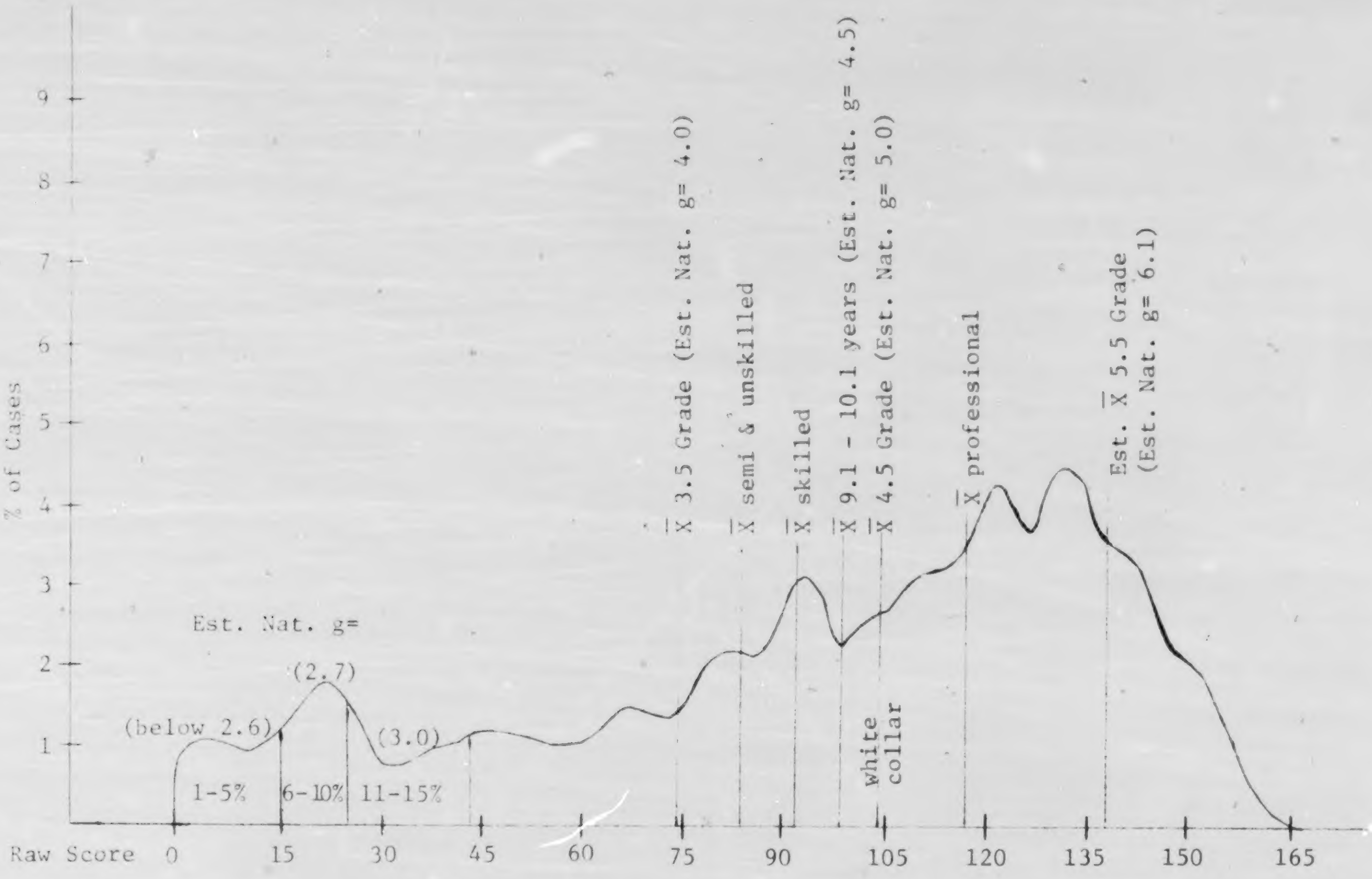
Similar results are obtained with criteria based upon quotients of achievement/expectancy such as those by Monroe (1932), Myklebust (1968), and others. The determining factor in the use of quotients is the subjective decision of the cutting score that is to be used to define retardation. For example, in his most recent formulation Myklebust (1968) computes an expectancy age by averaging the chronological age, the grade age, (the usual age corresponding to the child's actual grade placement) and the mental age. When an achievement age in reading or in some other area of learning is divided by this expectancy age, a quotient is obtained that resembles the IQ in the field of intelligence testing. Subjectively Myklebust has defined children with a learning disability as having an IQ of 90 or above and a learning quotient less than 85. There is no question that teachers report children defined by a learning quotient of 85 or less as having severe difficulty in learning and it is roughly comparable to one and a half to two years or more retardation in terms of the children identified.

If a distribution of achievement scores is examined, the large number of severe underachievers is obvious. For the basis of discussion, the following graph is included (taken from data collected by N. D. Bryant for the Association for the Aid of Crippled Children.)

Figure

DISTRIBUTION OF COMPOSITE READING SCORES*

Mid Year Testing (Feb. 1)
All of One Birth Year - 9 years 7 months ± 6 months



*Bryant for the Association for the Aid of Crippled Children.

The graph is based upon 727 children 9.0 to 9.9 years of age in upper New York State community suburban and city schools (public and parochial). Children classified as mentally retarded were excluded. Eighty percent of the children were in the fourth grade, and the great majority of children of this age who were in the third and second grade had repeated and should have been in the higher grade. The scores are a composite of the raw scores from the Metropolitan Achievement Tests in Reading for third and fourth grade and a Sentence Understanding Test. All scores were corrected for guessing. Removal of previously undiscovered mentally retarded cases would have a negligible effect upon the curve. Removal of all children below 90 IQ, the procedure used in many research studies, would leave the curve with the same skewness but fewer cases in the low scores. Of all the children in the low 15% of achievement in reading, 2/3 are boys. Excluding (on criterion of both verbal and performance) those with an IQ below 90 would eliminate 18% of the white boys and 56% of white girls, 50% of black boys and 72% of black girls. It is apparent that whatever measure of underachievement is used (number of years behind or an Achievement/Expectancy quotient), a large percentage of children would be so classified as retarded readers and the majority of them would be boys.

If we expect the normal distribution of achievement and try to construct a roughly symmetrical curve around the mode, it is apparent that the resulting curve based upon expected normal variation would not include the low 20 to 25%. When such a large number falls so far below the normally distributed curve, around the mode, it suggests that mean and even median scores will be highly influenced by the values outside of the symmetrical curve. Obviously other factors are at work in addition to normal human variability. These children in the low end of the distribution are not necessarily learning-disability cases. Their poor achievements may result from many sources, only one of which is a disability in learning.

Incidence studies of reading disability usually refer to underachievement not due to mental retardation. Regardless of whether a criterion of one and a half to two years below grade placement or a quotient score of achievement to expectancy is used, large numbers of children will be identified because they are achieving so far below the majority of their peers that they clearly represent a serious problem. In 21 studies of incidence of learning difficulties using various groups and criteria, the values range from three percent to 28%, half being above 13%. The report of the Secretary's (HEW) National Advisory Committee on Dyslexia and Related Reading Disorders (1969) summarized studies from a multitude of sources using many criteria for reading disorders and concluded, "Various studies available to the committee lead to the conclusion that reading disorders affect about 15% of the children in school today. . . The committee is convinced that the 15% figure based on measurement of reading performance without reference to mental ability is well beyond the range to be expected on the basis of normal human variability."

If we examine the children with IQ's of 90 or above who fall within the bottom 15% of the curve presented, relatively few have visual and hearing difficulties or have gross neurological defects. Also we find that on at least one measure of learning (associating each of four nonsense pictures with a nonsense word) the majority are impaired in their learning ability, as compared with a stratified sample from the top 85%. In addition, in measures of motor development, concept confusion, spiral-aftereffect illusion, perceptual motor performance and medical developmental history (suggestive of possible neurological risk) the low 15% are significantly differentiated from the upper 85%

in reading achievement. Thus a substantial number of low achievers, mostly boys, show signs of dysfunctions often associated with specific learning disabilities.

Incidence figures exist for poor achievement in various skills accompanied by learning process dysfunctions, and normal intelligence, ample opportunity to learn and the absence of gross sensory or emotional problems. Among disadvantaged populations where learning disability may be more frequent (due to greater prenatal complications, nutritional problems, possible experiential deprivation, etc.,), and where many other causes of poor achievement exist, the percentage becomes so large as to represent a major failure of general education. Most studies are almost uninterpretable because of lack of clarity about definition of LD. Several major studies are informative, however.

One outstanding study of the incidence of the learning disabilities, is the Rocky Mountain Educational Laboratory report on Individual Learning Disabilities Pilot Incidence Studies. 2400 second grade children in 80 classes in eight states were selected and the sample stratified by size of the community. All 80 teachers were asked to refer "those children who have severe difficulty learning in the second grade class you teach." The results were as follows: 478 referred, 117 excluded on data in their records as being low IQ or disadvantaged, 31 excluded on basis of tested IQ below 80 (24 were actually excluded, but by estimate; this would probably have been 31 if all children had been tested instead of only 284). In addition, 120 could be added on the basis of one and a half children per class who were found to be missed by the teachers on the original referral (this is estimated from the total class testing of four classes where six children with learning disabilities had been in the class but had not been referred by the teachers even though they were perceived as learning problems). All of these children were found to have malfunctions in one or more of the following areas as defined by deviant scores for the area on at least two tests: visual-motor, visual-memory, auditory memory, integration or organization, problem solving, self expression (motor or vocal) and use of two sensory channels simultaneously. Thus the percent of school children identified by the teachers as having severe difficulty learning in their classes, and having malfunctions in basic learning processes (after having excluded children with low IQ and cultural handicaps) suggests an incidence figure of learning disabilities as 13% with some additional cases probably existing but not identified by the teacher. Using a Myklebust Achievement/Expectancy Quotient of less than 85 to define severe learning disabilities resulted in 6.1% being considered as severe and 7.1% being considered as learning disabled but not severe. (The original study reported 4.7% and 6.0% because they ignored children selected as probable learning disabilities but not tested due to vacation or other unavailability. Estimating the number that would probably have been included if these children had been tested, yields the 6.1% and 7.1% values given above).

In a research study that dealt only with children of 90 IQ or above on either verbal or non verbal measures, Myklebust and Boshes (1969) tested 2767 children from 3rd and 4th grades in an above average socioeconomic community. In addition to screening out children with IQ's below 90, they eliminated those with visual difficulties, hearing difficulties, and children who showed anxiety. Using a definition of achievement/expectancy ratio of less than 85, they report 7.5% learning disability among these carefully screened children, with 4-1 ratio of boys to girls. Since the group with borderline IQ's contain a large proportion of learning disability children, this estimate is certainly a minimal one. If the screening had been IQ cases less than 80 the incidence figures can be estimated (48 of the 80 screened out on IQ would probably have been included) giving an incidence of about 9%. This study is particularly important since vision, hearing, and anxiety were found to eliminate about one in eight of the learning disordered children even though it is not al all sure that these were the primary cause of the learning disorder. Most eliminations were on the basis of anxiety which could be a result or correlate of a learning disability and not the cause.

Many other incidence studies reflect the same major points that have been discussed above. Of school children who are not mentally retarded 15-20% are learning problems and when exclusions are made for problems resulting from visual difficulties, hearing difficulties, environmental disadvantage, and emotional disorders, the incidence of children with some learning disabilities as presently defined is in the 5-15% range with more severe LD in the 5-10% range.

The distinction if frequently made between learning disability cases, and a subgroup that is commonly called "hard core". The "hard core" designation is reserved not only for the extreme degree of learning deficit, but for those with obvious neuropsychological disorder--the gross dysfunctioning of basic learning processes. This term is not operationally defined but opinions of the incidence of "hard core" cases is often 1/4 to 1% and seldom exceeds 5%. Comments are sometimes made at conferences and in personal communications by consultants that the field of learning disabilities is neglecting these children who were the stimulus for the origin of the field. They are much harder to treat and they are so few in comparison with the more easily treated underachievers who legitimately have some learning disabilities also. With this range of less than 1% to more than 10% the incidence of learning disabilities depends upon the severity of selection procedures and the operational definitions of dysfunctioning in basic learning processes. Since many of the children excluded by extreme screening have problems similar to the ones classified as learning disabilities, the practical task facing the learning-disability specialist in the schools is enormous. It seems evident that disabilities in learning is a continuum that is a significant factor in at least 10% of school children ranging from the child with grossly dysfunctioning learning processes which necessitate intensive clinical teaching to the child with moderate dysfunctioning who will exhibit his disability unless regular class instruction is individualized to fit his learning needs. In contrast to the studies above, in a survey of the principals of over 81,000 public schools (elementary and secondary), the National Center for Educational Statistics reports 48% of them cite no children with learning disabilities. The remaining principals who report that there are children with learning disabilities in their schools estimate an incidence of about 5%.

The presence of learning difficulties in a large percent of the population and the possibility that one third or more of these children could have some degree of learning disability does not necessarily mean that they all require special education. The crucial problem is whether many of them can be educated in regular classes if individualization, programmed instruction, and optimum materials are utilized. When good teaching, with individualization to fit each child's progress and needs, provides successful learning, there is no need for many children, even with neuropsychological dysfunction, to be handled in special education (e.g., in the task described above, of learning to associate four nonsense pictures with four nonsense words, children who had great difficulty or were unable to perform this task were often able to learn two associations--then learn two more and put them together. They could do this in just a few more trials than were required by normal learners).

If we define learning disability as suggested by the Northwestern definition (1967) in terms of need for special education and in addition, (1) if we provide standardized measures of various kinds of learning and (2) if we aid general education in individualizing and more effectively teaching children with some moderate dysfunction in basic learning processes, then the field of learning disabilities may be able to work with a small percentage of children actually requiring special education help, The National Advisory Committee on Handicapped Children (1968) of the U. S. Office of Education states:

> The total number of children involved cannot be accurately determined until more adequate diagnostic procedures and criteria have been developed. The disorders may range in degree from mild to severe. While the milder degrees of learning difficulties may be corrected by the classroom teacher, the more severe cases require special remedial procedures. A conservative estimate of the latter group would include from 1 to 3 percent of the school population. (p. 14)

In a recent analysis of the problem with a focus on cases requiring special remedial procedures, Kirk (1972) concludes, "At the present time it is difficult to estimate the percentage of children who require special remedial education for the correction or amelioration of special learning disabilities.... the best guess is that from 1 to 3 percent at the least, and possibly 7 percent at the most, of the school population require special remedial education."

Many specialists in the field estimate the incidence of learning disabilities as smaller than the range suggested by studies. Wissink and Kass (Appendix, 1972) surveyed the incidence estimates of 100 leaders in the field, 39 of whom responded. Half of the respondents estimated between 2 and 5% while almost a third estimated 15% or higher. This dichotomy reflects a basic difference in conceptualizing the field of learning disabilities. Many individuals in the field would use, or at least prefer, a greater emphasis upon pathology of neuropsychological functioning, severity of deficit, and inability to learn even in individualized classroom instruction. Others in the field focus on the large number of children with underachievement and apparent learning disabilities.

It is difficult from incidence studies to identify the relative percent of disabilities in different skill areas. There is a strong tendency for a disability in one area to be associated with disabilities in other areas. For example, the Rocky Mountain Study (1969) items on the Classroom Screening Instrument suggest multiple areas of disability with 2/3 having reading and spelling difficulties, 1/2 having arithmetic difficulties, 1/2 having handwriting difficulties, 1/3 receptive difficulties, 1/4 expressive difficulties and 1/4 concept confusion. (The overlap of different disabilities and the greater incidence among boys will be discussed later.)

Thus learning disabilities as presently defined tends to be frequent and to be expressed through combinations of learning areas. It is apparent that the field is not in agreement as to operational definition or incidence. Studies of incidence or even opinions of experts have little meaning until there is agreement on an operational definition for learning disabilities.

FRAMEWORK FOR SUMMARIZING SUBJECT VARIABLES

In considering the subject variables in learning disabilities the concepts and material from studies seem to naturally fall into the following categories and will be discussed under these headings:

Areas,of learning disabilities (characteristics, processes involved, and measures of the disability).

Etiological variables.

Correlates (including predictive correlates and possible causative dysfunctions).

Overlap of subject variables.

AREAS OF LEARNING DISABILITIES

It is possible to conceptualize every learned behavior as a potential area of learning disability. While severe impairment in any area of learning is usually accepted as a function it is not always seen as being within the scope of the field of learning disabilities. At present, only a small number of areas are regarded as being basic to the field. These are the areas referred to in most definitions and they involve understanding or using spoken or written languages, the areas with greatest educational relevance. A useful distinction of two bread groups can be made according to the type of difficulty children are having: (1) deficiencies in basic academic skills. This generally involves difficulty in reading at the word recognition and decoding level (not higher comprehension skills), spelling, writing (primarily focusing upon handwriting rather than the generation of words to be written) and arithmetic. (2) Separate, although related, are measures that reflect deficiencies in general language functions. They include difficulties in understanding speech, thinking, talking, and writing (with emphasis on composing rather than handwriting). Listening comprehension and reading comprehension are also general language functions not involving the mere recognition of words, but rather integrating the words to get higher levels of meaning from them.

Motor skills such as balance and tying shoe laces, perceptual-visual-motor skills such as copying a geometric form, auditory discrimination such as differentiating between sounds in similar words, etc. are treated by some specialists as separate learning disabilities. However, the field generally regards these areas as correlates and they are so treated in this paper.

One area that is presently not a major part of learning disabilities but is rapidly becoming so, is that of non verbal learning. Myklebust and others have included this in their operational definition. It is likely that with better measures of definition, particularly with extreme cases, non verbal learning will become parallel with basic academic skills and language in defining the concern of the field of learning disabilities.

There is some movement in the field not only to explain learning disabilities in terms of deficits in learning (i.e., poor reading achievement), but to use dysfunctions in basic processes to identify a particular learning disability (i.e., reading disability resulting from dysfunctioning in associating visual symbols with auditory trace). While this is a promising direction, at present the theoretical constructs, the instruments and the validation of both are not at the level to establish this approach. For the time being, learning disability is identified in terms of particular skills that the child has trouble learning. There is increasing interest in actual measures of learning in place of or in addition to measures of underachievement, but this too is a future trend with little impact at the present stage of development.

LEARNING DISABILITIES IN BASIC READING SKILLS

Children with learning disabilities in basic reading skills (not comprehension which will be considered as a part of language disability) differ in their proficiency in the various component skills that make up reading, e.g., word discrimination, word recognition, decoding, etc. However, they generally tend to perform poorly in all measures of reading and spelling. Many studies cite this finding and a good example is the factor analysis reported by Doehring (1968) of 79 variables reflecting almost every kind of measure collected in intensive work-ups of clinic cases of reading disability. A single reading-spelling factor was found in a sample of 10-14 year-old reading disability boys and also in a control sample. The factor structure was different for the two groups, however. In the control group, the reading-spelling variables were associated with language ability, particularly vocabulary. Among the reading disability sample, the reading-spelling factor was not associated with vocabulary but instead was defined by visual-perceptual speed (particularly sequential processing) and oral responses (digit span, rhyming, and serial responses). Thus reading-spelling disability appears to be a single factor. Spelling disability can occur independent of the reading-spelling disability and a separate spelling factor would probably have been found if the sample had been children selected because of spelling problems. The reading-spelling factor is clearly a function of basic perceptual and sequence processing dysfunctions. Findings of other studies tend to support these conclusions. It is likely that the tendency to perform poorly on all reading-spelling measures is the result of basic perceptual and processing dysfunctions handicapping all of the measures. However, poor performance on a possibly non-handicapped skill may result from its dependence upon a prior skill which is handicapped or from a lack of practice in reading due to another handicapped skill.

Judging from clinical case reports, if measures were taken of children's ability to learn different reading skills, there would be some very severe dysfunctions occasionally accompanied by relatively intact learning abilities. Certainly a distinction is often made between the two major processes that, while highly related, parallel each other in word recognition: (1) sight word recognition where entire visual patterns are perceived and (2) decoding of words by associating sounds with the word elements and synthesizing these sounds by blending them into a complete word. Among writers making this distinction, Johnson and Myklebust (1967) have been most explicit in assuming that one system may be relatively intact while the other shows serious dysfunctioning. They suggest that even when both systems show poor achievement one or the other may be remediated more readily. Learning disability in the sight word learning system is referred to as word recognition disability or as visual dyslexia. Learning disability in the sound association-decoding system is referred to as decoding disability or as auditory dyslexia. (The term dyslexia has unfortunately been used in so many ways that it is now a confusing term and will be avoided in this paper.) While there is considerable generality among the disabilities in the subskills that make up either of these systems, there may be both intact and disabled functions in the learning of different skills within either system.

There is much more research about the skills in the reading process and in the learning-to-read process than has been studied in terms of learning disabilities, and this relatively unexplored area is one with the greatest potentials for understanding the nature, prevention, and treatment of reading disabilities. Davis, Kling, and Geyer along with a large number of prominent researchers have spent several years reviewing the literature on research in reading with emphasis on models. Their report is in a massive volume (edited by Davis, 1971). In this volume, Jane Mackworth summarizes the processes involved in reading with an emphasis upon visual processes in word recognition. Anyone interested should study the volume on models and particularly Jane Mackworth's chapter which was used extensively in the following discussion. This and other papers in this particular volume go into much more detail than can be accomplished here. Many of the elements in the process of word recognition are relevant to other learning disabilities, and will be considered in some detail. Other factors in the process (e.g., attention) are so general to all learning disabilities that they will be discussed later under correlates.

Variables Involving Motor Skill In Reading

The motor component in fixating, releasing, and refixating in the process of reading is controlled by attention and by the self-monitoring feedback of the reader, usually in response to his comprehension of what is read. General motor difficulties are sometimes found among children with learning disabilities, and these might be reflected in the fixations that impair smooth input of visual information. Unfortunately, studies of visual fixation in poor readers are contaminated by the subject's poor reading. A study of fixation with unfamiliar material would be most useful.

Variables Related to the Storage of a Sensory Trace

It is clear from many studies, that the visual input from a fixation is stored for about one-fourth of a second as a type of direct sensory trace, and this trace is destroyed by the input during the subsequent fixation. There is almost no research concerning whether the visual trace of children with learning disabilities is deviant. While it seems more likely that these children have difficulty in coding information, a minor deviation in the time that images can be held in the sensory visual trace memory could have a profound effect upon the processing of print in reading and in learning to read.

Variables Related to the Adequacy of Coding into Iconic Storage

During the quarter of a second before it is masked by the next visual input, the sensory visual trace is compared with data from Long-Term memory. The match is then coded into a more simple and stable visual store, which is not destroyed by subsequent visual input, allowing for continuity in combining data from different fixations. This Iconic Memory Store is maintained between one and two seconds, sufficient time for the data to be coded into the Short-Term Memory.

Most sensory inputs are compared with neural-models, recognized, categorized, and discarded before the percept reaches conscience awareness. Only the interesting, important or unidentified reach the conscience level. (Is the time required for matching a sensory trace with a neural-model longer for learning disabilities children? Are these children less accurate at this stage or processing?) MackWorth (1971) cites some unpublished work by Granstaff, MackWorth, and Delapina where aphasic children with comprehension difficulties could reject simple visual shapes that did not match the sample just as fast as did normals, but when the asphasics found the matching pattern, they took twice as long as did normals to decide that it was correct. They seemed to be able to discard unwanted material quite satisfactorily, but were impaired in their use of visual traces for the more detailed process of positive identification.

Variables Involving Short-Term Memory

Much more complex than the previous stages in reading a word or learning to read a word is the coding of information from the Iconic Store into Short-Term Memory using the programmed code from Long-Term Memory. This coding makes substantial demands upon attention. The words from the Iconic Store are retained visually in Short-Term Memory as well as being simultaneously coded in other ways. This visual recognition memory is an important aspect of reading, but is relatively unrelated to intelligence (Samuels, 1971). The coding of words from the Iconic Store into Short-Term Memory is by means of motor speech programs. MackWorth (1971) concludes, "such programs will activate the matrices of acoustic and other sensory associations as well as verbal probabilities giving rise to expectancies as to what will come next. Short-Term Memory may last for several seconds, but is rapidly destroyed by incoming data. Material in Short-Term is processed in various ways by feedback and the processed data may be stored in Long-Term Memory or forgotten.. Is the initial processing of more complex stimuli relative to simple stimuli different for learning disabilities than for non-learning disabilities children?

When the word does not produce a match so that the visual image directly produces the motor speech program, (and probably even when it does), the coding into Short-Term Memory may be in terms of the letter elements or graphemes along with their associated sound elements or phonemes. These phonemes must be maintained in sequence and blended to produce the motor speech program. Learning disability children have frequently been found to make errors in visual details of the word perceived, (particularly details in the middle of the word). They show more reversals and sequence problems. Often they have greater trouble than normals in learning to associate the graphemes and phonemes, in retaining them in sequence and in blending them to form a word. Learning disability children will sometimes correctly synthesize a word without the meaning being immediately associated. Much research needs to be done on possible deviant functions in the use of Short-Term Memory. Left-right direction and sequence must be converted into a temporal direction. Luria (1966) hypothesizes that temporal coding (temporal lobe function) is the manner of maintaining visual sequence as well as auditory sequence errors consistently occurring together in reading, this suggests a greater interaction between visual processing and sound association in both directions than has usually been assumed. Short-Term Memory lasts for several seconds and is processed by programs and data retrieved from Long-Term Memory. The results may be stored in Long-Term Memory.

Variables Associated with Long-Term Memory

Storage in Long-Term Memory is in terms of the original visual input as well as subsequent coding and is simplified and combined with previous abstractions of similar stimuli. There are perceptual recognition units that may be features, letters, words, or even phrases. (Do learning disability children have greater difficulty than non-learning disabilities in abstracting to establish an accurate template from the input of many similar patterns?) Processing of different aspects of visual trace seems to go on parallel. The fact that an entire word can be matched as a unit if the neural template is well established in Long-Term Memory suggests that greater attention should be paid to the establishment of such templates with practice in their rapid retrieval. The current emphasis on decoding skills has perhaps minimized work in establishing accurate sight word skills.

Associated with the visual stimulus or word is a storage in Long-Term Memory of all the verbal records in terms of the speech motor programs, and the associated auditory and sensory experiences that make up meaning. The essential visual features of the word, its sounds, its speech motor program, and its meaning have all been abstracted so that minor variations (e.g. minor typographical differences) have been eliminated. Minimal clues tend to cause retrieval of the entire storage, a process that produces efficiency but can create problems for children with learning disabilities. They often do not have clearly discriminated templates in storage for words. Thus, words with the same initial letter and shape are erroneously retrieved. Therefore, discrimination training in learning the word (using words or nonsense words varying from the learned word only in the medial or end letter) should improve the details in the template of a word stored in Long-Term Memory.

Variables Utilizing Expectancy

Expectancy has an effect on the transfer of the Sensory Trace to the Iconic Store and on all subsequent processing. Recognition of letters is more accurate when they occur in a meaningful word, than in sets of random letters. (Do learning disabilities children make less use of expectancy than those without learning handicaps?) Factors influencing expectancy such as context of what is being read, spelling patters, probabilities of particular letters occurring after other letters, and mental set can facilitate or inhibit visual perception and coding when the word is read.

It is apparent from work by Sperry and Gazzaniga (1967) that the retention of the template, the recognition of words, and the associated meaning is stored in both hemispheres since patients with disconnected hemispheres respond to printed instruction if seen only by the left visual field, (right cerebral hemisphere), even though the subject seems unaware of reading the material. Localized storage of motor patterns of speech in the left hemisphere and the bilateral and more generalized storage and processing of visual information suggests that impaired functions in different areas are likely to give rise to widely varying disabilities.

Learning disability children may have a different processing time. Blank, (1968) found that poor readers tended to perservate on the first of a pair of spoken words that they were asked to read. Some experimenters (e.g. Ellis, 1960 and Belmont, 1966) have suggested that retarded children may have as good or better memory than normals and that it is merely in the coding and retrieval they are deficient. The same appears likely for learning disability children, and this is particularly important because coding and retrieval strategies can be taught. An understanding of the neuropsychological processes involved in learning, retention, and retrieval is of immense practical importance to the field of learning disabilities in planning remedial methods. Procedures that are very different from those presently used may be generated by increasing knowledge in this area.

There are many achievement measures used in inferring the presence of reading disabilities. Most frequently utilized are group measures of silent reading ability as the criterion for underachievement. There are many tests to measure silent reading and there are considerable variations between them. Such tests commonly measure reading vocabulary and comprehension. Comprehension is evaluated in numerous ways with different tests trying to reflect its various subskills. Some of these measures use extremely short selections where the child can depend upon reading the question and then scanning the preceding sentence or two in order to find the answer, whereas others use relatively long selections with questions asked only at the end of the reading.

Most reading tests use fairly adequate measures to distribute the total population. The majority of the discrimination is in the mid-range of the test, and they are really not designed to do an effective job of identifying children at the low end of the scale. For example, sometimes there is the problem of guessing. A total non-reader going into third grade taking the Metropolitan Reading Test for that grade will most likely achieve a reading score of 2.6 if he did nothing but guess at each of the items. Many poor readers do guess when they cannot respond to questions. Kelly and Karey (1934) studied standardized vocabulary and reading tests, and found twenty-six different approaches for measuring knowledge of word meanings. For the learning disability child the method of measurement may be extremely important in as much as some tasks may utilize procedures that are more handicapping to the child than are others. The main focus in most vocabulary measures is to get at the knowledge of the meaning of the word: Failure at this task for a child with a disability often reflects his inadequacy to recognize or decode the word. In addition, some vocabulary measures are timed while other are power tests, so the learning disability child may perform quite differently on the two tests, whereas the normal reader would not be influenced greatly by the variation in measurement. Vocabulary tests are sometimes constructed to tap intelligence. Recognition of the word is not enough, but in choosing a correct synonym or alternative, there are wrong answers that have some logical association with the word originally recognized. This tendency to add verbal intelligence variance to a test of word recognition is unfortunately found in many of the standardized reading achievement tests. The type of words selected for vocabulary measure can greatly influence the learning disability child's performance. Some of these children may have more difficulty with abstract words in comparison to concrete ones that is true for the general population. The measures of reading comprehension in silent reading tests are perhaps more variable than vocabulary measures. For the general population, correlations between reading vocabulary tests and reading comprehension measures are relatively high, almost as high as their reliability. However, considerable differences may exist for learning disability children. Basic reading skills are essential to comprehension and deficient language ability is often associated with basic skill difficulties. However, language disability reflected in reading comprehension difficulty can occur in spite of adequate basic reading skills and will be discussed in a later section.

The use of silent reading measures of vocabulary in comprehension do a poor job of differentiating between various learning disability cases. However, when extreme scores are taken as a criterion of underachievement, such tests serve to identify poor achievement in reading. Children with poor word recognition are often grouped with those having difficulty with word meaning and reading comprehension. Silent reading measures for the primary grades tend to place great emphasis upon the recognition of words, but at higher grade levels, there is an increase in measurement of general intelligence so that a test designed for fifth and sixth grade level tends to have a very high loading on intelligence.

Oral reading tests are used almost as frequently as are silent reading measures to define learning disabilities populations. These tests usually involve word recognition and the reading of oral paragraphs. They place very little emphasis upon comprehension, and tend to tap the mechanics of reading. They provide an indication of the kinds of problems the child is having, and generally are more appropriate than group administration of silent reading to entire classes. Some test batteries include word recognition and oral reading, as well as a number of other measures. The most popular are the Gates-McKillop (1962), the Spache (1963), and the Durrell (1945). Measures of oral paragraph reading sometimes with comprehension questions include such tests as Gray Oral (1967) and Gilmore Oral (1951). A particularly frequent usage is the Wide Range Achievement Test, which in reading provides only a measure of word recognition. Informal reading inventories are mentioned in case reports but seldom are used in articles to select the reading disability sample. While the norms may vary considerably, the factors being measured by these tests are probably more similar than those in the silent reading tests. The focus among the oral tests is almost entirely upon the mechanics of reading and in spite of the presence of comprehension questions for some of the tests, little attention is paid to the meaning being attained from reading. While it is possible than an expressive difficulty will tend to impair performance on these measures, they incline toward identifying poor word recognition and decoding skills which seem to be the most frequent of all learning disabilities. Unfortunately, the reliability of most of these instruments is only moderate.

The effect of using silent reading measures as a criterion for selecting children with learning disabilities in reading produces considerable heterogeneity in terms of the disabilities so identified. This heterogeneity increases with increasing grade level and complexity of tests. Certainly any group selected by means of the silent reading measures could benefit from testing with oral reading tests to separate those with difficulties in the mechanics of reading from those who have difficulty in the thinking involved in reading. The use of such heterogenious groups makes it difficult for research studies to identify specific characteristics or even treatment response of children with particular disabilities in reading.

Some studies use elaborate batteries and much more detailed measurement to select and to characterize children who have learning disabilities in reading. Individually administered test batteries are mentioned above and group administered diagnostic tests (such as the Stanford, Doran Diagnostic, Bond-Clymer Hoyt, etc.) may be used. Others describe the specific abilities and traits of the child in terms of analysis of errors made in oral reading and word recognition, as well as performance on tests reporting to measure subskills of reading, such as blending. Data from clinical studies suggest that relative performance on a variety of different measures include the analysis of errors and sub-score measures directly related to the planning of treatment interventions. This suggests that research of individual cases and the summing over a number of such cases might be a more effective method than using studies with extremely heterogeneous groups.

A particularly promising measure, because it can be collected many times, consists of the probes used in precision teaching (Haring, Appendix G, Kunzleman, 1970). The task may vary greatly, but the measure is in terms of the number of behaviors counted, such as words read correctly in a given period of time. This allows continuous measurement without the limitation of having only two or three forms of a test. The crucial factor is in defining what behaviors are to be counted.

LEARNING DISABILITIES IN ARITHMETIC AND MATHEMATICS

The state of the literature on disabilities in arithmetic and mathematics is one of awareness and concern but of little action. It includes reports on underachievement, descriptions and associations with other learning disabilities and association with symptoms frequently related to all learning disabilities. Disabilities in mathematics seems to have a much lower priority as a research topic than reading and language disabilities.

Learning disabilities in arithmetic involve much more than difficulties in computation. Chalfant and Scheffelin (1969) reviewed the processes in quantative language and made distinctions between the different cognitive abilities:

> "A number of different cognitive abilities are probably involved in comprehending the structure of numbers, performing arithmetical operations, and developing quantitative concepts.
>
> In considering these disorders it is helpful to make a distinction between arithmetic and mathematics as is being done in recent "modern math" programs in schools. Mathematics is the abstract science of space and number which deals with space configuration and the interrelations and abstractions of number. Arithmetic is a branch of mathematics that deals with real numbers and their computation. The distinct peculiarity of numbers is that they represent concrete entities. In contrast, Barakat (1951) points out that a mathematical expression is an abstract scheme which does not represent anything concrete and requires a Gestalt quality for the appreciation of form and configuration.
>
> The concrete nature of arithmetic and the abstractness of mathematics not only suggests that different cognitive abilities may be involved but that they might be disordered in several different ways. In mathematics, for example, children might experience difficulty in handling the operations, interrelations, and abstractions of number or the structure, measurement, and transformation of space configurations. Difficulty in arithmetic might include such things as reading or writing isolated numberals or a series of numerals, reading and writing numbers whose names are not written the way they are spoken (twenty one = 21, not 201), recognizing the categorical structure of numbers (units, tens, hundreds, thousands), and doing computational operations.

> The reading and writing of numerals and the calculation of numbers with or without numerals are often disturbed at the same time. The reading-writing and calculation are frequently grouped under a single designation, causing confusion. Hermann (1959) points out that there is a difference between: (a) the reading and writing of numbers (numerals); and (b) the calculation of numbers. He believes that the defective ability to read numbers (numerals) should be classified under "dyslexia", and that the term "dyscalculia" or "acalulia" should be reserved for defective ability to perform calculation. The distinction between the inability to read and the inability to perform arithmetical and mathematical operations is helpful, because it identifies two different aspects of a general problem area."

Defects in quantitative thinking in adults has been associated with lesions in most areas of the brain, but acalculia, the disorder in adults most related to the severe learning disability in arithmetic for children, is clearly a disfunction of the parieto-occipital area of the cerebral cortex and is closely connected to spatial operations and spatial concepts. Luria (1966) reports: "Writers who have made a special study of disturbances of the concept of number and of arithmetical operations accompanying lesions of the parieto-occipital division of the brain are unanimous in declaring that these disturbances are based on a disorder of definite spatial syntheses.....according to these writers, with lesions of the parieto-occipital systems of the brain, the reference points in a symetrical space which are essential for a correct calculation are lost in arithmetical operations and become impossible through the loss of their spatial coordinants."

In addition to processing dysfunctions and results of learning disabilities in arithmetic, it is clear that poor teaching and emotional-attitudinal factors can also give rise to underachievement in this area. The factors in mathematical disabilities are described by Kenneth Travers and his associates as falling into two categories: "social-emotional" and "cognitive-academic" (Travers, et. al. 1971). Social-emotional problems affecting performance in mathematics are often related to high rates of absence, goals based on a view of the immediate future, low motivation, anti-social behavior, shor attention span, and inability to see practical uses of mathematics. Cognitive-academic problems include a record of failure in mathematics, achievement scores at least two years below grade level, reading and comprehension difficulties in many cases, inability to follow directions well, a tendency to leap to conclusions, and an inability to generalize. Grossnickle, Brueckner, and Reckzeh (1968) make the distinction between specific and complex disabilities cases. The former are growth problems, simply lacking facility with basic facts, and can be considered merely corrective cases. The complex disability cases are more severe and have a variety of reasons for their lack of progress in learning. It is noted that the complex disability cases soon develop emotional reactions to mathematics. Beyond statements of underachievement and of gross descriptions thereof, only fragmentary notions and practically no research reports appear in the literature. The usual approach to disabilities in mathematics is to regard them as attributal to general systems associated with all learning disabilities: "Many of the symptoms that identify children with learning disabilities can be related to arithmetic disabilities (disturbances in spatial relationships, visual perception abnormalities, perseveration, difficulties with symbols, and cognitive disturbances". (Kaliski, 1962). A typical study in the literature is Ross (1964) in which are described the characteristics of sixth and seventh grade students who were two years below their arithmetic grade level in achievement:

1. Mean percents of accuracy in the basic computational processes were as follows: addition - 88 percent; subtraction - 79 percent; multiplication - 60 percent; division - 33 percent; addition of fractions - 18 percent; subtraction of fractions - 14 percent; multiplication of fractions - 8 percent; division of fractions - 2 percent.

2. Students evidenced satisfactory reasoning in word problems involving addition and subtraction of whole numbers, but made frequent reasoning errors in problems involving multiplication and division of whole numbers as well as in all the process-involving common fractions.

3. Sixteen (out of 20) of the students were one or more years below their mental grade levels in functional reading ability as measured by the Durrell Analysis.

4. Teacher assessment and cumulative records indicated that students were underachieving generally in school subjects other than arithmetic.

5. Teacher assessment and personality tests indicated that the students characteristically were withdrawn and defeated in their attitudes toward school and society.

6. Sixty-three percent of the causes of underachievement identified by classroom teachers were of an emotional nature, involving lack of interest, home or school maladjustment, short attention span, or limited initiative.

7. Fifteen of the students had shown immaturity and slowness of general development, while thirteen of them manifested abnormal physical conditions, ranging from low vitality to rheumatic fever.

8. Parents tended to be from lower socio-economic classes. Three parents owned small businesses, two were salesmen, twelve were skilled or unskilled laborers, and three were unemployed.

9. Parents of twelve of the students tended to hold one or more teachers responsible for their child's inadequacies.

Several studies have pointed out that children with arithmetic disabilities may excel in reading and vocabulary skills, with or without reading comprehension problems. While the subject variables correlated with learning disabilities in arithmetic will be discussed later along with those associated with other learning disabilities, there have been particular findings of deficiencies in visual spatial organization and non-verbal integration (Strauss and Lehtinen, 1947), disturbances in body images (Kephart, 1960) and lower performance I.Q. than verbal (Johnson and Mylkebust, 1967). Left-right confusion and poor perceptual motor skills have also been noted as characteristics of underachievers in arithmetic. Gerstmann type syndrome (bilateral finger agnosia, right-left disorientation, agraphia, and acalculia - Gerstmann, 1924) is often referred to in the literature but is seldom reported as a finding in children with under-achievement in arithmetic.

Learning disabilities in arithmetic (and mathematical concepts) is a collection of different disorders, some of which can exist independently even though they tend to occur together. Process analysis such as that developed for word recognition does not receive much attention in the literature, but listing of specific defects helps to define subject variables characteristic of this disability. The process in arithmetic may begin just as in reading when material is presented visually (or as in listening, when problems are represented by dictation), except that the program for coding of the data and the meaning associations may be stored in a different area of the brain. If recognition of numbers cannot be learned, it suggests a condition comparable to a sensory aphasia arising from occipital dysfunction. In these cases the child may be able to solve verbally presented problems. Interpretation of what is recognized is dependent upon concepts stored in Long-Term Memory. This relates to experience with quantity and space, comparable to an inner language in other forms of verbal language (Johnson and Myklebust, 1967). In severe cases, absence of this number concept can result in a child having trouble recognizing that one group is larger than another, and inability to utilize a 1-to-1 relationship (e.g. getting the right number of pieces of candy for four children), delay in developing the concept of conservation and perhaps even the inability to do meaningful counting (although rote repetition of number sequences may be learned).

Spatial factors are a crucial part of arithmetic thinking. Even in a narrow sense, spatial orientation is essential to differentiating 9 from 6 and 21 from 12. The meaning of numbers is dependent upon a categorical concept. Even if 21 can be distinguished from 12, the category of units and tens is necessary to process the information. Incomplete mastery may result in the writing of "two hundred one" as 2001. Visual and auditory sequential memory of numbers in a multi-digit number is important even if the concept of categories is intact.

If number recognition, number meaning, spatial orientation, visual and auditory sequential memory and categorical concepts are all adequate, the numerical operations must still be learned. There appear to be extreme differences in terms of the number of learning trials that are necessary for learning and maintaining numerical operations. Perhaps mild dysfunction of the more basic processes just described are associated with the necessity of isolating the numerical operation to be learned, and providing large numbers of trials to learn it. Even when learned, there may be confusion in applying a numerical operation in a more complex situation. In addition, the abstract nature of symbols (e.g. : or =) may make them more difficult to comprehend than a number.

Numerical thinking is supported with verbal constructs (e.g. the word "multiply" has meanings associated with the term not only in labeling, but in handling concepts of magnitude, relative size, conservation, time and quantity. These are arithmetic processes dependent upon language ability. Furthermore, multiplication facts can be used verbally even though learned by rote).

More complex reasoning in quantitative terms appears to be more reasoning than arithmetical function. Some cases of learning disabilities in math can solve complex problems if they're told the operations to use, but they cannot think through the operations required. This type of arithmetic reasoning disability may be independent of ability to read the problem and even of the child's general reading comprehension. Most children reported as having a learning disability in arithmetic do not show complete dysfunctioning in the basic processes. However, they do not use the processes efficiently and have difficulty in learning the numerical operations as well as in thinking through arithmetic reasoning problems.

Articles referring to learning disabilities in arithmetic frequently use the arithmetic section of the Wide Range Achievement Test as a criterion for measuring underachievement. This measure taps increasingly complex numerical operations in rather large steps. Group tests taken from regular achievement tests are sometimes used, but they frequently require reading informs as low as second grade. Some measures differentiate between numerical concepts and numerical operations. The former provide measures of the concept of number, relative size and of adding and subtracting. The numerical operation measures are merely grade-appropriate arithmetic problems of increasing difficulty. The "word problems" require reading and figuring out what numerical operations need to be performed. These are not only measures of arithmetic operations but also of reasoning and language facility. Diagnostic evaluation from either informal or published tests usually depend upon a series of problems at each successive level of difficulty, so that an analysis of errors will identify the deficient skill in numerical operations. If a child can add two two-digit numbers when not required to carry from the units column to the ten's column, but cannot perform the addition when carrying is required, then it is obvious that the skill element has not been learned. Many of the tests at higher levels combine measures of arithmetic reasoning, numerical operations, and numerical concepts.

Left-right confusion, spatial orientation, and time concepts are an important aspect of quantitative thinking, but these and the more basic concepts of number are seldom measured in articles on arithmetic underachievement.

Chalfant and Scheffiin (1969) review Luria's (1966) steps for investigating comprehension of number structure and arithmetic operations of children with brain lesions, as well as other clinical and standardized procedures for assessing arithmetic abilities and disabilities. They summarize the assessment procedures for disorders in arithmetic and conclude "at present there is no systematic procedure for evaluating and diagnosing disorders in arithmetic and mathematics."

LEARNING DISABILITIES IN SPELLING

Spelling disabilities are treated tangentially in the literature and are usually mentioned in connection with reading disabilities. While a spelling disability is usually present when there is a problem in decoding words and in most other reading disabilities, it also occurs when there is no reading problem. Spelling in association with reading difficulties is often used as the hallmark of language disability. A number of authors suggest that spelling is a more sensitive indicator of language disabilities than reading because there are fewer and less effective methods for compensation of disabilities. Spelling is frequently a residual problem that remains after a child who previously had reading difficulties has overcome much of the problem. Aho (1968) described children with spelling difficulties in terms of not perceiving and retaining the memory of words as configurations, not arranging the sound in the correct relationships to make up the auditory part of the word and not establishing the sequential movement pattern necessary for making letters. An analysis of the kinds of errors made in spelling to determine the nature of the dysfunction is proposed by many authors but Bannantyne (1971) suggests that this is not a fruitful approach mainly because of the extreme difficulty in classifying the vast majority of errors. Spelling errors are made even in phonically consistent words, but as can be expected, increase in irregular words. While English is not as phonetically consistent as some languages, correct spelling patterns for phonemes can be predicted the majority of the time when the main phonilogical facts of position, syllable, syllable-stress, and internal constraints underlying the orthography are taken into consideration.

Poor handwriting is often, but not always associated with spelling disability. Bannantyne and Wichiarajote (1969) report a significant correlation (r = .40) between spelling and sound blending on the ITPA among the educable mentally retarded and it is likely to be as high or higher among learning disability cases. Zbinden (1970) found that spelling correlated highest with grammatic closure on the ITPA, was most closely associated with the automatic sequential level of the test and that the auditory-vocal channel contributed most of the variance in spelling ability.

Brueckner and Bond (1955) indicate that poor spellers are unable to make a varied or analytic approach to new words. Their methods are characterized by incorrect syllabication, spelling letter by letter or by small phonic elements. Obviosuly, lack of auditory discrimination would cause difficulty in spelling and this is frequently observed.

There is less attention paid in the schools to spelling than to reading and it is likely that much underachievement in the former area is a function of the type and amount of instruction as well as difficulty in central processing. Johnson and Myklebust suggest that the majority of children with learning disabilities have deficits in spelling. They believe that spelling requires more auditory and visual discrimination, memory sequentialization, analysis, synthesis and integration, all performed simultaneously than with any other skill. (Myklebust and Boshes, 1969) found syllabication to be a significant discriminating factor between all learning disabilities and the normal sample.

The process of spelling involved discrimination of phonemes in words and a phonetic analysis of the word. To identify the phonemes, motor speech patterns are used in this process, at least in early learning stages, as indicated by difficulty children have in spelling words when they hold their mouths open and hum. Reauditorization of phonemes as the graphemes are written is usually present, thus the child's own articulation is a crucial stage in learning phonetic analysis. This probably continues to be used with the analysis of most words, the exception being those that are spelled very automatically. The sound elements resulting from phonetic analysis must be preserved in the correct sound sequence. Syllabication ability greatly facilitates phonetic analysis of longer words as an aid to breaking up the task, retaining the element to be analyzed and as cues to the spelling rules based upon syllables. The sound elements must be re-coded into optic structures - graphemes. The graphemes must be re-coded into a system of motor acts (either written or vocal.) Haptic associations are often used in graphemes re-coding and sometimes an individual depends upon finger movements to help him spell a word even when asked to do so orally.

Measures of spelling achievement are usually based upon a list of words arranged in order of difficulty. Sometimes this is an informal procedure, and at other times standardized tests are used. A few diagnostic tests such as the early Gates Russell Spelling Diagnostic Test (1937) contains a number of sub-tests: 1) spelling words orally, 2) word pronunciation, 3) giving letter for letter sounds, 4) spelling one syllable, 5) spelling two syllables, 6) word reversals, 7) spelling attack, 8) auditory discrimination and 9) a measure of the effectiveness of visual kinesthetic or combined methods of study. Other more recent diagnostic tests follow similar pattern. A test using nonsense words would be a less contaminated measure of process variables and such techniques are used informally inclinical diagnosis. Ability to spell the word in writing but not orally is sometimes found clinically, perhaps because haptic associations facilitate the motor encoding. The most frequent indicator of spelling difficulties is failure on classroom word lists that have been assigned, as well as the large numbers of spelling errors on written work. Usually the spelling problem is so extremely obvious to teachers that they are not readily confused with minor deviations from normal performance. A study of children who read normally but have spelling difficulties and reading disability children with similar spelling difficulties would be a very useful analysis that might clarify the unique nature of spelling disabilities.

DISABILITIES IN HANDWRITING

There is a general distinction between writing and handwriting. The former refers to the act of committing one's thoughts to the written form and encompasses the ideational use of language as well as visual, auditory, and visual-perceptual-motor abilities. The latter focuses on the motor aspect of writing.

In the literature there is much hypothesizing but very little factual data pertaining to handwriting disabilities. An overall view, however, shows that it is difficult to separate handwriting disabilities from other learning disorders. Therefore, a study of the problem must take related areas into consideration.

To understand dysfunction in handwriting one must begin by investigating the basic skills that are necessary for writing. Some elements of language disability will be considered in this discussion.

In normal development, before a child can write, he must initially learn to communicate in other ways. First comes comprehension of the spoken word, then usage of the same. This process requires auditory reception and expression. The second step involves reading, a visual receptive process. After this has been accomplished, only then can the child write. According to Myklebust (1965), written language is the last language skill acquired and is achieved only when all the preceding levels have been established.

Handwriting requires pre-writing skills: grasp of writing utensils, position of paper, posture, etc. The actual writing involves letter-shape patterns, letter-sequencing patterns, and several types of eye movements as well. Handwriting training is an example of an automatic, coordinated, learned, muscular operation subservient to environmental demand, cognitively interpreted.

The young child usually learns to print first, but soon changes to cursive. Strauss and Lehtinen (1947) suggest that cursive should be taught initially so that children need not transfer from one form to another. In the case of the dysgraphic (writing disability) child, Johnson and Myklebust have experienced printing to be easier because the motions are less complex and there are fewer reciprocal movements and changes of letter forms.

Since reading precedes writing, the dyslexic child is usually unable to write or is unable to write more than he can read. Spelling is difficult for these children because they can't simultaneously revisualize and reauditorize letters needed for writing, and are often incapable of discriminating between words that sound or appear alike. Furthermore, their inability to write may be derived from a number of "breaks" in the sequence or chain of events necessary for learning.

Orton (1937) stressed that writing problems were common in children having a reading disability and who were confused in the use of the right hand. He presented evidence to show that poor writing quality occurred when left handed children were forced to use their right hand in infancy. He also observed that a developmental agraphia may coexist with a reading and spelling disability but a writing disability is encountered not infrequently as an isolated disorder.

While some children are developmentally retarded in learning to write because the necessary areas of the brain do not develop in the normal manner or at the usual rate, others may have poor handwriting as a result of a lack of skill in the finer movements of the hands and fingers.

Myklebust (1965) sums up the contributing factors to handwriting disorders:

1. developmental deviations

2. psychomotor aspects such as paralytic disorders, ataxia (a cerebellar disturbance not causing paralysis but affecting coordination) and apraxia (injury to the sensorimotor elaboration areas of the cortex).

3. visual processes

4. auditory processes including dysnomia, syntactical aphasia, receptive aphasia, reauditorization of letters, auditory sequencing, syllabication and auditory blending

5. a discrepancy between spoken and written language

6. reading disability

7. speech handicaps

8. social and emotional disturbances

9. deafness

10. cultural deprivation

11. instructional factors

Nielsen (1962) concludes that the highly specialized function of printed and written language is located in the frontal writing section of the brain. The secondary parieto-occipital-temporal junction may be responsible for associating written or printed symbols with their phoneme equivalents. (Critchley, 1953. Luria, 1966). Penfield and Roberts (1959) show that writing is carried out by the dominant hand which is controlled through the motor hand mechanism in the opposite hemisphere and involves the kinesthetic image of the movement required to produce each word. In writing, kinesthetic feedback will allow one to correct automatically and instantly for deviations from the habitual pattern. Vision will also contribute feedback information to be matched against established visual patterns.

Since handwriting focuses on the motor aspect of writing, a child cannot do so until he has attained the necessary motor maturity. Writing is primarily a motor skill, but requires visual-motor coordination. It entails not only the mechanical skill required in the formation of letters and words, but also requires spelling, language and grammatical abilities. Problems in visual stimulus processing or in the performance of voluntarily controlled motor movements of the hand will interfere with the formation and structuring of letters.

Measures of handwriting studied in agraphic adults may be applied to children and are appropriate when almost total inability to write exists.

Luria (1966) has done extensive investigation in the field of learning disabilities and has devised several tests to analyze the elementary components and levels of writing. He begins with the writing of individual letters, syllables and words and ends with complex forms of speech. The first group of tests determines if an individual can make a written response to a visual stimulus. In the second group auditory stimulus evoking a written response is investigated.

In the 1930's there were many handwriting scales developed to go with the emphasis on handwriting instruction. Today, however, most evaluations of handwriting difficulty are subjective judgments. Illegibility, taking too much time to shape the letters, reversals, or in extreme cases, just inability to write are the bases of judgments of a handwriting disability.

LANGUAGE DISABILITIES

Most learning disabilities are disorders of basic skills normally achieved through school instruction. In contrast, disability in understanding speech, thinking with inner speech, or speaking is apparent early in a child's life. Children of school age may first be recognized as having a language disability because in spite of acquiring speech, they may have trouble with listening comprehension, reading comprehension (even when the basic reading skills are adequate), organizing thoughts, abstract thinking, concepts, effective verbal expression, and effective written expression (even when basic handwriting and spelling skills are adequate.) Language disability is likely to be associated with other basic skill disabilities even though each can occur independently.

Adequate hearing, vision, motor control, and normal general intelligence must, by definition, be present in cases of language disability just as in other learning disabilities, however, moderate impairment in hearing or in discriminating sounds, in motor difficulties, and in performance on some verbal tasks are often associated with language disability.

Extreme cases of language disability in children are similar in many respects to adult conditions of receptive and expressive aphasia, but they involve different neuropsychological dysfunctions rather than a loss of existing function. Children with extreme receptive aphasia may have general auditory disability and be unable to interpret either spoken or non-word sounds. More frequently they do not properly understand or use language and have difficulty in remembering what they have learned. There is no single common characteristic to the disorder. Individual differences must be taken into account; however, if good hearing and normal intelligence are indicated but there is a lack of oral communication, these children are said to be receptive aphasics.

Some general characteristics of receptive aphasics are: normal intelligence, normal or only slightly defective hearing, inability to name objects, inability or partial ability to associate spoken names with objects, inability or partial ability to imitate names of objects, poor recall of names that the child has repeated, and inability to interpret or use environmental language (McGinnis, 1963).

These children fall into the four patterns mentioned below: 1) Use of jargon-scribble speech; 2) Use of jargon with some intelligible words or phrases that relate to a situation; 3) Repetition of words without meaning--echolalia; 4) Infrequent vocalizations. Particularly crucial in understanding language disability is the concept of inner language which has only begun to be conceptualized by such authors as Myklebust (1954), Werner and Kaplan (1963), Penfield and Roberts (1959), Russell and Espir (1961), and Geschwind (1967). Receptive aphasia obviously affects inner language or thinking. If a child does not understand or use language properly, the sounds he receives are not translated into meaningful experience. He does not obtain information which can be stored for use in a later situation. He is not able to analyze new sounds in terms of those he already knows since there is a deficit in his memory bank. Concept confusion, (left-right, on-under, beside, larger-smaller, etc.) is an early and persistent symptom of much language disability. The inability to utilize abstract concepts and the difficulty in categorizing which are clearly present in some cases have been suggested by Goldstein (1948) as a major language disability characteristic resulting from neurological dysfunctioning; but other authors, including Luria (1966) suggest that even sensory aphasics can utilize metaphors, allegories and other abstract thinking.

Children with no receptive problems and no apparent inner language difficulty may have trouble in using expressive language. Although they have normal intelligence and hearing and can understand language, they cannot imitate words and are often limited in their ability to imitate individual speech sounds. These children are termed motor or expressive aphasics. There are many combinations of this disability. They may not be able to reauditorize words spontaneously nor execute the motor patterns for speaking or writing. They may have difficulty in planning and organizing words to express ideas in sentences. In the most extreme cases, some children may use only short vowel sounds with an occasional consonant while others cannot even imitate sounds in isolation. When attempting to speak, the sounds do not resemble what they are trying to say. Many expressive aphasics cannot memorize a sequence of sounds although they are able to articulate single sounds. If they can pronounce a single word, they cannot memorize word sequences in a sentence.

Most commonly seen are not the extreme, totally aphasic children, but those exhibiting a more subtle disability; the child who misunderstands, says things wrong, has trouble organizing and interferring from what he hears or reads.

Many theories on the development of language have been proposed; the models range from behavioristic and computer to cognitive and psycholinguistic.

It is generally agreed that each language task is partially learned before developing higher proficiencies in the other language skills. There is clearly an interaction between reception, expression, and inner language.

Chalfant and Scheffelin (1969) provide an excellent summary of the processes in the development of language:

> "The acquisition of receptive auditory language behavior....The child first attends to vocally produced sound units, then must discriminate between the sound unit and an experience. This association allows the child to interpret the vocal sound unit as a meaningful language signal which is stored for retrieval at a future time. The child improves his receptive language by analyzing more complex signals and by increasing the speed and accuracy of interpretation. Finally, with sufficient practice the child can shift attention from the vocal-language signal to the meaning carried by the signal sequence. Thus he will be able to respond appropriately to verbal commands, instructions, explanations, and questions.
>
> . . .acquiring expressive auditory language. First, the child must possess the need to communicate, and make the decision to send the message. Second he must formulate the message by retrieving and sequencing the appropriate language signals. The third stage consists of organizing the vocal-motor signal and producing that vocal-language signal. Simple vocal-language signals are combined to form more complex vocal-language signals. In time, the child gradually increases the accuracy, length, number, and types of vocal-language sequences to the point of automatic production. Finally, the child shifts attention from the mechanical aspects of sound production to the content of the message to be sent. This enables him to produce appropriate verbal instructions, commands, explanations, descriptions, and questions.
>
> The acquisition of vocal-motor production has been analyzed. . . First, random movements of the vocal-motor apparatus produce random vocal-sound units. The child attends to the kinesthetic stimulation of the vocal-motor movements, and the auditory stimulation of the vocal sound produced by himself and by others. As the child begins to repeat vocal-motor movements, vocal-sound units are reproduced. He also begins to discriminate between different sounds and movements and to associate vocal-sound movements which produce them. The correspondences which are established between vocal-motor movements and the vocal-sound units are stored for retrieval at a later time. The speed and accuracy of vocal-sound production is

increased until the child can automatically produce the appropriate vocal-sound unit. A complete treatment of the complex and finely tuned mechanism for vocal-sound production may be found in Lenneberg (1967).

Methods of assessing children's performance on various subtasks of acquiring auditory language have been developed through the years. A comprehensive review of representative measures can be found in Spradlin (1967). Analysis of these published test batteries show that they have been developed, with few exceptions, from exisitng tests, and not from a task analytic approach. . . There is need to conduct future research on the specific subtasks involved in decoding, encoding, and producing auditory language among the normal preschool population. Also, there is need to task-analyze the conditions of acquisition in cases of dysfunction in processing auditory language."

Many measures can be taken to assess the degree and area of the language disability. Total or partial lack of understanding or lack of speech demands an evaluation of auditory acuity and discrimination. Audiometric and language measurement in preschool children have relatively low reliability because such factors as poor attention may prevent appropriate responses. An audiometric test given to school-aged children will determine if the problem is due to poor acuity rather than emotional disturbance, mental retardation or receptive aphasia. If there is a slight acuity impairment, it may be related to language disability even when it is not severe enough to be causative. It is probable that central nervous system dysfunctioning affects both the sensory and processing functions in these children.

In the area of auditory discrimination, in addition to the often used Wepman Auditory Discrimination Test (1958), there are numerous other measures including the recent Goldman, Fresca, Woodcock Test (1970) for auditory discrimination, which solves a number of problems of measurement in this area. This latter test uses tape recorded speech and merely requires the listener to point to a picture of the test word.

Extreme dysfunctions are usually evaluated clinically: assessing ability to reauditorize, organizing words into correct grammatical and syntactical sentences, and carrying out the motor functions of articulation and writing. Erroneous answers are used to measure the nature of the language disability such as circumlocutions or defining words that cannot be recalled, substitutions of similar words, saying the word only after writing it, poor oral reading when silent reading is better, etc. Tests of aphasia for adults (e.g., Schuell, 1965) aid in identifying disabilities in children with extreme handicaps. An educationally relevant review of measures of language disability is presented by Myklebust and Johnson (1967).

Tests such as the ITPA (Kirk, McCarthy, and Kirk, 1968), Beohm Test of Concepts (1969), and other tests of concept confusion tap factors that may reflect language disability even when reception and expression are adequate. For children, preschool to ten years of age, the ITPA provides the most widely used and most systematic measures of language functions and for this reason it is described below in some detail. Kirk and Kirk (1971) describe the theory and measures that make up the ITPA.

"The hypothetical construct on which the ITPA is based relates those functions whereby the intentions of one individual are transmitted (verbally or nonverbally) to another individual and, reciprocally, functions whereby the environment or the intentions of another individual are received and interpreted. It attempts to interrelate the processes which are involved, for example, when one person receives a message, interprets it, or becomes the source of a new signal to be transmitted. It deals with the psychological functions of the individual which operate in communication activities. . .

These are the routes through which the content of communication flows. Included here are the modalities through which sense impressions are received and the forms of expression through which a response is made. The channels may include various combinations of sensory input and response output. The major modes of input are auditory and visual; those of output are vocal and motor. Many combinations of input and output are possible but due to practical limitations, the ITPA incorporates only two:

The auditory-vocal channel,. . .

The visual-motor channel,. . .

In analyzing behavior which occurs in the acquisition and use of language, three main processes are considered:

The receptive process, . . .

The organizing process, . . .

The expressive process, . . .

The degree to which communication behavior is organized within the individual determines the level of functioning. Two levels are postulated in the clinical model of the ITPA:

1. The representational level includes behavior which requires the more complex mediating process of utilizing symbols which carry the meaning. . .

2. The automatic level includes communication behavior requiring less voluntary but highly organized and integrated patterns. This includes such activities as visual and auditory closure, speed of perception, ability to reproduce a sequence seen or heard, rote learning, synthesizing isolated sounds into a word, and utilizing the redundancies of experience. . .

The subtests of the ITPA which were generated from this model tap discrete functions which are incorporated in the three dimensions just discussed. Each utilizes a channel, a level, and a process. It will be noted from the model that the following functions, each of which is tested by a separate subtest of the ITPA, occur at discrete intersections of the three dimensions described above.

1. Auditory Reception (the ability to understand auditory symbols such as verbal discourse).

2. Visual Reception (the ability to gain meaning from visual symbols).

3. Auditory Association (the ability to relate concepts presented orally).

4. Visual Association (the ability to relate concepts presented visually).

5. Verbal Expression (the ability to express concepts verbally, i.e., vocally).

6. Manual Expression (the ability to express ideas manually).

7. Grammatic Closure (the ability to make use of the redundancies of oral language in acquiring automatic habits for handling syntax and grammatic inflections).

8. Visual Closure (the ability to identify a common object from an incomplete visual presentation)..

9. Auditory Sequential Memory (the ability to reproduce from memory sequences of digits of increasing length).

10. Visual Sequential Memory (the ability to reproduce sequences on non-meaningful figures from memory).

Supplementary tests: Auditory Closure and Sound Blending.

Another measure of language function is the Picture Story Language Test devised by Myklebust (1965). It measures written language according to productivity or length of expression; syntax or correctness of the expression; and abstract-concrete or quality of the ideas expressed. Slingerland (1964) discusses some of the early characteristics of moderate language disability and has devised tests to measure language dysfunctions as well as basic skill problems which she considers as a part of language disability.

In less extreme cases, language disability is reflected in poor comprehension or thinking about what is heard or read. The most commonly measured aspects of language disability is poor reading comprehension (when basic word recognition and decoding skills are adequate and do not cause the lack of understanding). These measures are often designed to tap many subskills are often just as high as between those supposedly measuring the same subskill. F. D. Davis (1944) developed tests of the nine skills which he considered to make up reading comprehension. They are (1) knowledge of word meanings, (2) ability to select the appropriate meaning for a word or phrase in the light of its particular contextual setting, (3) ability to follow the organization of a passage and to identify antecedents and references in it, (4) ability to select the main thought of a passage, (5) ability to answer questions that are specifically answered in a passage, (6) ability to answer questions that are answered in a passage, but not in the words that the question is asked, (7) ability to draw inferences from a passage about its contents, (8) ability to recognize the literary devices used in a passage and to determine its mood and intent, (9) ability to determine a writer's purpose, intent, point of view, The extent to which a given test of silent reading comprehension is loaded with one or another of these various kinds of items might alter the performance of children with learning disabilities far more than it would children with no language difficulties.

Cloze procedure (having to fill in a blank left in place of every nth word of a particular type) has been used to reflect comprehension. It can be applied to test comprehension many times to provide continuous measurement. The use of cloze on summary after reading the entire selection seems promising since it does not break the normal reading and comprehension is based upon what has been read as well as what is being read.

For all moderate levels of disability in understanding spoken or written language and expressing oneself in speech or writing, the most frequent identification is the judgement of teachers. Language difficulties are so handicapping that unles arithmetic, non-verbal reasoning, or some other ability is noticeably high the language problems are likely to be interpreted as lowered intellectual ability.

OTHER LEARNING DISABILITIES

As indicated earlier, it is possible to conceptualize every learned behavior as an area of learning disabilities. The field has focused upon a few major areas, but one additional area is appearing; the area of non-verbal learning disorders. This seems to violate the terminology in definitions that group all learning disabilities related to language. In addition, there is a question as to whether the disability does not usually exist in association with other dysfunctions and seems a collection of correlates. Even if it is usually associated with other disabilities, it appears to represent a specific disability area of its own, and adults with known brain damage sometimes develop symptoms characteristic of non-verbal learning impairment. A few authors, notably Johnson and Myklebust (1967) identify this area as comparable to language disability and describe its characteristics. The brain sometimes processes verbal and non-verbal material in rather different manners and defects in perception and imagery and in general non-verbal thinking can occur when other disabilities are not as extreme. Frequently, however, non-verbal disability is associated with other learning problems. Children with non-verbal learning dysfunctions may have difficulty interpreting pictures. They may fail to understand the implications of gestures or facial expressions and may be unable to perceive social meaning of every day events. Social behavior is often handicapped. Words may be readily used but they often lack real meaning, as if the experience necessary to establish meaning is missing. Hughes (1967), Zigmond (1966), and Myklebust and Boshes (1969) provide studies of children with this disorder.

Most of the perceptual-motor, body image, left-right confusion that are now treated as correlates can be considered as part of this area of disability. Currently the field pays much attention to perceptual-motor and related difficulties as a predictor and correlate of other disabilities. Since much of the perceptual-motor training has not been found to be useful in preventing or remediating reading disabilities or related problems, it is likely that some learning disabilities personnel will emphasize this new area of disability rather than give up their investment in perceptual-motor, body-image, and other remedial work. The educational relevance of this area, the nature of the disability and measures of it still need to be clarified by research. It seems likely that a major area of learning disability will develop and it will necessitate a restatement of definitions of LD beyond understanding or using spoken or written languages.

ETIOLOGY

There has been much theoretical speculation and some studies on the conditions that could produce Learning Disabilities. Most of these are related to conditions that would cause dysfunction in central-processing-neuropsychological dysfunction. Etiology is important for understanding and preventing learning disabilities, but many specialists do not consider it relevant for planning treatment. Etiology is usually considered in terms of events in the child's history (genetic, pre-peri-post-natal, trauma, etc.). To the extent that the antecedent conditions are only possible causes, etiological factors are actually correlates about which we infer a causal relationship. A continuum of neuropsychological dysfunction from moderate learning disabilities to severe cases of gross brain damage has been attributed to many of the etiological factors.

Genetic

It has long been noted that learning disabilities tend to occur more frequently in particular families and a number of genetic studies have been carried out. The largest scale study is one by Hallgren (1950) using genetic analysis on familial incidence and symptoms of 276 children and their families. One hundred sixteen were diagnosed as having specific reading, spelling, and writing difficulties. Eighty-eight percent of the families of dyslexics had other family members with LD. The analysis showed high probability that specific dyslexia is a genetic disorder and he suggested that it follows an autosomal dominant mode of inheritance.

Other information on the genetics of specific dyslexia utilized data from twin studies. These were reported by Hermann (1959) and include the twins used in the Hallgren study and in studies by Norrie. In twelve pairs of identical twins, whenever one twin had dyslexia, so did the other. In 33 pairs of fraternal twins, only eleven sets showed both having dyslexia and in 22 cases only one of each pair was classified as dyslexic. These investigations and other data lead Hermann to the conclusion that this type of learning disability is largely a hereditary one. Walker and Cole (1965) studied 75 families having three siblings all with IQ's of 90 or above. They reported that the incidence of severe spelling disorders was much higher in certain families and that there were clear sibling groupings. Differences were highly significant. Wolf (1967) studied 32 boys with specific language disability and without gross brain damage or severe personality problems. He found significant differences from controls. The fathers had a similar disability but not the mothers, and the brothers showed the same problems but not their sisters. Delker((1971) reports on data collected through family checklists which again is suggestive of familial patterns in reading disability. Many other studies have been reported and make an overwhelming case for genetic etiology of some learning disabilities. While there are more boys than girls with LD, it appears that it is not a sex-linked condition (the trait is not carried on the x or y chromosome). Orton (1937) and Ingram (1965) among others, believe the disorder is recessive rather than dominant. Bannatyne (1971) and others believe it is almost certainly a polygenetic factor. Lenneberg

(1967) reviewed the genetic evidence relating to the inheritance of language ability and concluded the familial occurance of congenital language disability is well-documented and that congenital language disability is probably a dominant sex influenced trait with at least a fair-penetrance--both global language facilitation and global language difficulties may be attributed to inherited factors.

Obviously the presence of familial patterns, as opposed to family environmental influences, still does not imply that a given case of learning disability is a result of genetic factors but only that genetic factors seem to operate in a large number of cases.

Certain correlates of learning disorders are found in non-hereditary genetic defects caused by sex-chromosome abberations. Females with Turner's Syndrome (one x chromosome, no other sex termining chromosome) exhibit gross deficiencies on pattern copying tests, on perceptual tests of the WISC, Draw-a-person test and Space subtest of the Primary Mental Abilities Test. They also have gross difficulty with the left-right directional discrimination and mild dyscalculia (Alexander, Walker, and Money, 1964). No reading or other verbal difficulties are encountered. Males with Kleinfelter's Syndrom (an extra x chromosome in the male, causing sterility) show a tendency toward congential dyslexia and apraxia for the spoken word (Money, 1964).

Pregnancy and Birth Complications.

The events in the prenatal, perinatal, and immediate postnatal history of the child have association with later learning disabilities. Kawi and Pasamanick (1959), Pasamanick and Knobloch (1960), found that children with reading difficulties were products of pregnancies with complications (toxemia, bleeding, prematurity, etc.) significantly more often than were controls. Other experimenters have confirmed this relationship, e.g. Weiner and others (1966) in a follow-up study at 40 weeks, three and a half years, six to seven years, and 13 years, found that low birth weight was significantly related to development and learning problems. Virus infections, particularly during the first trimester of pregnancy have repeatedly been shown to be associated with lowered intellectual functioning and sometimes with learning disabilities in spite of normal intellectual ability. The effect of drugs taken by the mother, accidental poisoning or blood incompatibilities have all been shown to have a variety of handicapping effects, one of which is learning problems.

Among the most common birth complications associated with learning disabilities has been an insufficient supply of oxygen to the child. Graham (1962) Graham and others (1963), and Fraser and Wilks (1959) have carried out follow-up studies showing that children with anoxia at birth perform less well in cognitive, perceptual-motor and motor tasks. Some studies suggest that this is not always related to any general intellectual deficit but there is a possibility that the number of complications of birth and pregnancy that occur together seem to increase the severity of subsequent problems. Improvement with age is generally reported. Strother (1963) points out that inferred brain injury related to variables of trauma, birth or prenatal difficulties, is associated with many other signs during the early maturation of the child. All of these have been associated with later learning problems. "Observations of brain injured children may begin in infancy--restlessness, sleeps lightly and irregularly--over reacts to stimulating--resists restraint--and engages in constant exploratory behavior--seldom persisting for any length of time in any one activity--unable to screen our irrelevant stimuli-----"

Damage to the Central Nervous System of the Developing Child due to Trauma or Infection.

While it is dangerous to generalize about bumps on the head creating learning problems (since most normal learners also have had bumps on the head), there are numerous clinical studies pointing out that brain injury from pressure on the brain or a blow which is followed by unconsciousness is associated with later behavioral and learning problems. Infections, particularly those noted for involvement of the central nervous system (encephalitis and meningitis), have repeatedly been reported as causes of learning disabilities and in some cases where the child was learning normally, have resulted in an immediate and obvious dysfunctioning in learning. Lead poisoning from eating paint chips as well as other substances injurious to the central nervous system have also been associated with learning disabilities, suggesting that minor damage may produce dysfunction without grossly affecting the general intellectual level of the child.

Maturational Lag

Many authors, particularly Bender (1942, 1958, 1968) deHirsch (1954, 1966, 1968) and Silver and Hagen (1960), have noted the apparent immaturity of children with learning disabilities and suggest the lag in maturation of some aspects of the central nervous system is the basis for the child's learning disability. It is often observed that children with learning disabilities due to maturational lag will partly overcome this difficulty as they grow older. Unfortunately, learning that has been missed before the child has matured to the point where he can learn may prevent response to later instruction unless there is remediation of the most basic elements that he has missed. It is quite possible that his maturational lag is a result of a genetic characteristic, complications of pregnancy and/or birth, early trauma or infection, the child's nutrition and that of the mother when he was in utero, or the absence of critical experiences during the development of the basic processes of the central nervous system.

Nutrition

Nutritional deficits can affect height and other bodily development including the most developmentally sensitive organ, the brain. Only recently has there been increasing concern over nutrition as a cause of learning disabilities. Current interest has been sparked by various treatment programs where megavitamin therapy and nutritional supplements have been clained to be effective in overcoming the behavioral and learning problems of children (e.g. Cott, 1972). There is a growing awareness that poor nutrition is common not only in the ghetto, in Appalachia, and among minority groups but even among families having wealth and sufficient food, the nutritional intake may be severely inadequate (The American Diet, 1969). Nutritionally impaired children have been found, in extreme cases, to be deficient in DNA in the brain cells (Winick, 1968). These children have significant developmental delay in intersensory integration (Cravioto and others, 1966). There is a confounding of etiological factors since nutritional deficits are more common in low socio-economic and minority groups. Nutrition is related to prematurity, pregnancy complications, and the lowered resistance to disease. Nutritional deficits must be considered from two etiological viewpoints: one, in relation to long term severe nutritional deficits (primarily protein deficits which may have interfered with the proper development of the central nervous system), and secondly, current nutritional deficits which may not provide for the effective functioning of an otherwise intact or only moderately impaired central nervous system. Again, there is a confounding between various etiologies since nutrition is related to metabolic disorders such as hypoglycemia, and other biochemical disorders.

Biochemical

Various metabolic disorders have been suggested as causes of LD. While it has been clearly established that metabolic defects can cause mental retardation, the evidence relating to learning disabilities has been primarily one of hypothesis and suggestive clinical studies. Hypoglycemia which interferes with normal functioning has been repeatedly mentioned as a cause of learning difficulties (Green and Perlman, 1971, Cott, 1972). Smith and Carrigan (1959) suggest that learning disabilities result from an imbalance of acetylcholine-cholinesterose. The use of Deanol, presumed to be a precursor of acetylcholine, has been reported to improve learning (David, 1966, and Oettinger, 1958), but other studies find no improvement over placebo effect. The possible improvement in learning with the use of Deanol and the clearly established improvement in learning of some children when given cortical stimulants does not establish a biochemical basis for their disability but certainly raises the possibility of such an etiology.

Money and Lewis (1964) observed general impairment of receptive and expressive language among children diagnosed as hypothyroid.

Silver (1971) presents neurochemical, pharmacological, physiological, and clinical data to support the view that neurohumoral imbalance is an underlying cause of certain learning disabilities. At present, the biochemical causation of learning disorders is hypothesized except for some clinical case studies. However, further investigation into this area may identify these factors as the mechanisms in genetic defects, trauma, or maturational lag as well as in cases of previously unidentified etiology. The importance of this area lies in the potential for medical treatment of certain learning disability cases.

Environmental and Emotional Factors

Environmental and emotional factors by definition, are excluded from the classification of learning disabilities. However, the presence of learning disabilities among environmentally deprived children should be greater than among other groups because of the higher frequency of conditions that could cause basic learning process disorders, (e.g., prematurity, poor nutrition, etc.). The presence of these disorders among emotionally disturbed children should be greater than among other groups because of problems resulting from failure due to the disability. The same neuropsychological dysfunctioning that is the basis of the learning disability may cause a child to be extremely vulnerable to emotional disturbances. The exclusion of many such cases may be unwarranted unless the associated problems require different treatment, but environmental disadvantage and emotional disturbance may be etiological variables for learning disabilities. Many papers suggest the possibility that when these conditions occur early in life, they produce a dysfunctioning in the basic psychological processes necessary for learning. One idea is that at crucial times in the maturation of the central nervous system, the lack of certain types of experiences may result in inadequate development of neuropsychological structure or function. More commonly, absence or disruption of essential experiences is assumed to interfere with learning-to-learn strategies. At present, the studies of environmental disadvantage and emotional disturbance are so contaminated by genetic, attitudinal, educational opportunity, and other interacting factors that it is difficult to evaluate their relevance as etiological variables of learning disabilities. This is an area that needs both research and reconsideration in learning disability theory and in excluding children from learning disability services.

CORRELATES AND PREDICTORS OF LEARNING DISABILITIES

While previous sections have discussed the variables that define the many learning disabilities and etiological aspects, this section examines other variables that are found with greater frequency among learning disability children than among children without handicaps. These correlates may, but do not necessarily contribute to or result from the disability itself. It seems likely that in many instances, the factors that generate the disability cause deviant performance on other variables as well, resulting in a correlation between the variables and the disability. When a correlate occurs before the development of the disability, it becomes a predictive correlate regardless of whether it contributes to the disability or not.

The variables identified as correlates of learning disabilities differ from study to study. One reason for differences between studies is the difference in the samples identified as learning disability. Several areas of disability and diverse criteria for the same disability area contribute to this variability which has been discussed previously. Heterogeneity in samples also results from different age, sex, SES, linguistic backgrounds, etc., as well as variations in the definition of learning disability used to select the sample.

The number and type of variables chosen for study are even more important in determining correlates. Some studies use almost a case approach for each child with a multitude of measures. Other studies only examine one or two variables crucial to the question being researched. Thus not finding a particular correlate in a number of studies does not imply that it is not present. It may merely mean that it was not even considered.

Some studies are oriented to minimal brain dysfunctioning with learning disability as the defining symptom. These studies often use samples coming to clinics and include measures of neuropsychological signs and history. At the other end of the spectrum are studies that are not even concerned with learning processes and may only be interested with identifying educational deficits and prescribing remedial instruction based upon a task analysis of the areas to be taught.

Even when studies are very similar in the samples and measures used, they sometimes get exceedingly different results. One study is likely to find a strong correlation while the other finds nothing at all. It is not always clear why there are such discrepant results and the correlate is considered possible but not established.

In the following discussion, the frequency and agreement of findings about correlates and predictors will be considered. A comprehensive discussion of each study is prohibitive and the subjective and undefined factors in many of the studies make for tenuous and problematic conclusions. Therefore, general summary statements will be used with the clear understanding that they are often interpretations of studies that make up the body of learning disabilities today.

There is no correlate that is always reported to be present in learning disabilities although this may be because the majority of studies do not examine the most likely source of universal correlates: measures of how the child learns. Most variables associated with learning disabilities sometimes occur in children without dysfunctions, yet in spite of the lack of universal factors and all the differences between studies, there is a surprising degree of agreement that certain correlates are consistently related to learning disabilities regardless of the area of the disability. These common correlates include attention and concentration disorders, perceptual difficulties, motor-development problems, left-right confusion, feelings of failure, greater intra-individual variability, deviant activity level, and need for instruction in small increments.

Identification of these correlates come from studies in educational settings emphasizing underachievement as well as from medically oriented studies of neuropsychological functions. Yet the most frequently reported correlates are those that have previously been named as signs of organicity and used in identifying the syndrome of minimal brain dsyfunction. Perhaps it is because learning disabilities was one of the major defining variables in identifying minimal brain dysfunction samples; or because these variables have been discussed so much that they are looked for in more studies; and perhaps because of neuropychological dysfunctioning. It is most probable that the findings result from all three of the factors listed above. With the similarity of correlates emerging from the studies of underachievers and minimally brain dysfunctioning children and the fact that most minimal brain damage is now subsumed under learning disabilities, it becomes particularly useful to examine these correlates in the light of previous classification of the minimally brain damaged. In addition to the historical perspective (since learning disabilities developed in part from the work with minimally brain dysfunctioning children) it will be useful to examine correlates that were not found in studies of the minimally brain dysfunctioning. Clements' (1966) monograph on minimal brain dysfunction attempts to classify the signs and symptoms that are found in studies of such children. He uses a classification system consisting of 15 overlapping categories. Current findings of learning disability correlates will be grouped under these headings and agreements and discrepancies will be noted. It must be remembered, however, that many of the minimal brain dysfunction studies are now included in studies of learning disabilities (e.g., reading, arithmetic, and spelling disabilities, poor printing and writing, various categories of aphasia, etc.). Some reordering and grouping of Clements' categories will be used in the consideration of correlates of learning disabilities.

Disorders of motor function include general motor development, perceptual-motor skills (which have some overlap with perception and neurological signs), motor activity level (which have some overlap with neurological signs) among other motor functions. Within this category, perceptual-motor difficulties, general deficiencies in motor development, and hyperactivity are the most commonly reported correlates. While many studies do not look for or find these correlates, few reports provide measures without finding a correlation with learning disabilities.

A history of clumsiness with delay in walking, tying shoes, etc. is more frequent among children with learning disabilities than controls. The Lincoln-Oseretsky (1955), the Purdue Perceptual Motor Survey (Roach and Kephart, 1966), and a variety of other scales are used to measure motor development, such as balance, large and fine motor coordination, rapid alternating hand movements, and patterned movements using both sides of the body. Sometimes the motor difficulty is obvious and can be judged by the child's gait and manipulation of objects. Frequently, however, the difficulty is not found unless a standardized test is used. Even the ability to smoothly follow a moving object with the eyes is sometimes identified as a correlate but this is contradicted by other studies. Studies of eye movement on reading material are of little value since fixations and regressions are a function of the learning disabled child's poor word recognition. Poor motor control in drawing and writing are significantly related to learning disabilities even for areas of disability other than handwriting. Copying of geometric figures, motor parts of the Frostig, drawing a person, and copying and writing words are all related to a variety of learning disabilities. Evidently, even when there is no perceptual problem, the visual-motor coordination necessary to make a line go where the child wants it to go is often lacking. There is usually improvement in visual-motor coordination as the child grows older and becomes more experienced, but some children continue to show significant deviations from normal age expectations.

Hyperactivity and to a lesser extent hypoactivity are frequently identified as correlates of all types of learning disabilities. Even when the child is not currently displaying hyperactivity, there is frequently a history of such problems. There are different types of hyperactivity and different causes (e.g., Keogh, 1971; Denckla, appendix H.). Hypoactivity can be a withdrawal and hyperactivity can be a reaction to anxiety and stress, however, most of the literature assumes (with much of supporting evidence) that a great percentage of hyper- and hypoactivity level demonstrated in a variety of situations is related to neuropsychological dysfunctions rather than emotional factors. It is sometimes noted that in cases of known brain damage resulting in hyperactivity, stress and emotional factors can make the condition worse. The paradoxical effect of cortical stimulants upon some types of hyperactive children (while not upon non-handicapped children) is another argument for a neurological basis of the difficulty.

Generally hyperactivity decreases with age. Various other correlates such as attentional problems and impulsive behavior are often reported occurring with it. This clustering either confirms the Strauss Syndrome (Strauss and Lehtinen, 1947), or reflects experimenters' awareness of it.

Hyperactivity can be measured as a motor function with instruments that gauge movement in a chair or movement of the arm with a watch-like counter. Motions also can be counted by an observer. In addition to the frequency or extremeness of movements, the extent to which they interfere with the attention to or the performance of a task might be a more significant measurement. Although adequate attention can exist in the presence of moderate hyper or hypoactivity, these conditions usually impair attention. Hyperactivity and hypoactivity can be modified by operant procedures.

Just what do such correlates mean? While no exact figure can be given, it is likely that half or more of children with severe learning disabilities will show one or more of the correlates just described while a much smaller number of non-handicapped children will show these variables. The older the age group, the more likely is it that problems will be noted in the history rather than from current measures.

Clements refers to frequent athetoid, choreiform, tremulous or rigid movement of the hands and frequent tics and grimaces but these are seldom reported in the learning disability literature, possibly because they are rarely looked for.

Associated with the disorders of motor functions discussed above are correlates of learning disabilities which Clements has labeled disorders of attention and concentration. Many studies note that most or at least a large proportion of learning disabled children being studied have difficulty maintaining attention on a task. Short attention span and distractability are the terms most often used. The majority of observations are made during the testing or school instruction periods and it is hard to evaluate whether some children's attention problems are partly specific to the task. However, a substantial number of children with learning disabilities seem to have attention problems even for television and other non-school tasks. Most frequently this is associated with hyperactivity. Moderately hyper-active children can be attentive while their motor activity seems directed elsewhere, but severe hyperactivity almost precludes adequate attention and concentration. Hypoactivity is sometimes noted in a more passive loss of attention, with the attention being apparently turned inward to thoughts as well as to other environmental stimuli. Impaired concentration is the description often associated with activity level disorders but it also is found among learning disability children who do not show hyper- or hypo-activity.

As children grow older, the obvious signs of hyperactivity become less noticeable but subtle impairment in attending, concentrating and being easily distracted, may still be present.

The major problem with attention and concentration is in terms of measurement. Observations can be used for gross inattention but may be very inaccurate at other times. The active child may still be attending while the quiet child with eyes focused on the teacher may be thinking about something unrelated. Measures with required responses and built-in distractors can determine attention in one type of situation, however, such standardized measures are seldom used. Learning disability children working with a teaching machine program are sometimes noticed to "turn-off" and lose their attention to a very simple and reinforced task. Remedial teachers also complain of this loss of attention. Measures using EEG can reflect attention as can changes in the eye when visual attention is involved. Studies interrelating attention measures and learning tasks are needed. The theoretical model by Senf (Appendix K) provides a basic framework for studying attention in the learning process.

Attention problems seem to be greater when there is concurrent stimulation to which the child must attend. Awareness of two simultaneous touches or integrating visual and auditory stimuli seems to place a special burden on learning disability children. It has been suggested that the problem is one of attending to irrelevant stimuli instead of just focusing on a particular aspect and letting everything else become background. Minor and irrelevant details are emphasized in severe cases. Perseveration, a continuing of attention or behavior when a task calls for a change, is often noted in learning disability children who are usually distractible. Thus the entire system of attending and the shifting of attention seem impaired in some cases. Functions related to attention are diffusely represented in the brain; and at least two particular cortical areas and the entire reticular activating system are specifically related to attention.

In cases of known brain damage, attentional deficits comparable to those seen in learning disabilities cases are common. Children with learning disabilities often have difficulty in making decisions, sometimes because they impulsively select one alternative without considering all alternatives and sometimes because they do not seem to be able to concentrate and make a decision. Kagan's (1965) concept of impulsivity is not always found to be as highly related to academic success as he suggests, but impulsivity is certainly characterisitic of some learning disability children.

It seems likely that, if attentional problems were carefully identified, the majority of severe learning disability children would be found to have such disorders. However, some non-handicapped children would show similar difficulties.

In the category, Impairments of Perception and Concept Formation, there are a number of correlates of learning disabilities.

Learning disabilities children make perceptual errors in reading, writing, spelling and arithmetic. Reversals of letters, words, numbers and columns are related to poor left-right and general spatial orientation difficulties. Often there is a confusion about the concept of left and right. While reversals and perceptual confusion can be perpetuated by lack of practice in the perceptual skills used in reading, writing, etc., it is evident that the perceptual difficulty is not entirely a non-practice problem. On tasks that have not been practiced (e.g. response to an instruction to touch your right eyebrow with your left thumb, selection of pictures that are identical as opposed to mirror images, etc.), learning disability children show slow and inaccurate performance long after it is easy and automatic for control subjects. While practice in left-right discrimination helps overcome this problem, the large amount of practice necessary is an indication of the degree of difficulty many learning disability children have with this type of problem.

Perception of details within a gestalt, perception of a figure when there is a confusing background, perceptual speed (rapidly identifying a figure that is the same or different from a standard), and recognition of inaccuracies in copying from a standard are all correlates of learning disabilities and are reflected in numerous measures such as the perceptual aspects of the Frostig and Bender-Gestalt tests.

Visual-perceptual difficulties seem unrelated to basic visual acuity and most studies indicate that the visual functioning of learning disability children is similar to that of controls (even though this reflects some difficulty in visual functions for both groups.)

Auditory discrimination is often less adeuqate for learning disability children than for controls, particularly those with language difficulties and disabilities in decoding type of reading and in spelling. In early receptive or expressive language difficulties there is sometimes a minor auditory acuity problem, but for most learning disabilities, auditory acuity is normal.

Whenever there is perception involving two modalities, particularly when the data must be integrated, the impairment of learning disabled children is increased. However, this may be a factor of overloading. There are suggestions in the research that the cross modal transfer problems described by Birch and Belmont (1964) and others may be accounted for by memory of a pattern with the presenting modality.

The perception and retention of visual and auditory sequences is particularly deficient in many learning disability cases. This may pertain more to the retentional rather than the perceptual aspect, however.

Perceptual skills mature rapidly from about 6 to 9 years of age and the learning disabled child frequently resembles a much younger child in his skills. However, after about 10 years of age, there is an improvement in the perceptual skills of learning disabled children even though they remain below the performance of controls. An older child with a learning disability in listening and reading comprehension is less likely to show visual perception difficulties than a younger child or even a child of the same age who has a disability in basic academic skills. Silver and Hagin (1966) report data to suggest that perceptual difficulties that are overcome in the visual modality may still remain in adulthood in the less practiced haptic modality.

Many concepts are normally learned almost incidentally or with very informal instruction. Learning disabled children continue to have problems in judging and telling time; knowing the days of the week, months and seasons; judging relative size, distance, and amounts; and knowing the parts and integration of the human body long after these have become established concepts for most children. This may represent a conceptual difficulty or may reflect trouble in incidental learning. The amount of remedial instruction necessary to teach these concepts suggests that it is a real conceptual difficulty.

Disorders of perception and conception that are correlates of learning disabilities are identical with those reported by Clements. The impaired tactile discrimination which he lists is seldom reported except in studies of minimal brain dysfunction. All of these perceptual and conceptual correlates can be produced by brain damage and many of them are used as indicators of organicity. While numerous control subjects would show these impairments before the age of 9, few retain the problems past this age while a majority of severe learning disability cases would show several of the perceptual and/or conceptual impairments until they were much older.

Test performance indicators can include any of the measures that are discussed under other sections. One test indicator that is frequently reported is the greater intra-individual test performance of the learning disabled child, This is not just the difference between achievement and expectancy that is a defining variable, but instead is a variability due to deficits in a few areas. While not many studies support greater intra-individual variances, there is a general agreement that learning disabled children usually have several substantial deficits in comparison to their other scores on tests like the WISC, ITPA, etc. Another type of variability frequently notes is variation in performance on the same type of measure on two different occasions.

Particular intelligence test scores are found to be discrepant. Some studies (Myklebust and Boshes, 1968) report a much lower correlation between verbal and performance tests for learning disorders than is found in a normal population. Verbal IQ lower than Performance IQ is frequently found, particularly for disabilities in language. In other cases a much higher verbal than performance IQ is found. One caution must be observed in interpreting a wide range of variability on intelligence subtest. If children with low IQ are screened out, then any low score must be compensated for by a higher score and our selection procedures encourage greater intra-individual variability as an artifact, e.g., children may have high verbal and high performance; high score on verbal or performance but low on the other; or low verbal and low performance. The latter condition is ruled out by our selection criteria. Particular scores on the WISC that are often found to be low for children with reading-spelling difficulties are Information, Arithmetic, Digit Span, and Coding.

While all studies using the WISC do not report these particular low scores, enough do to establish these as correlates of learning disabilities. Probably the age and type of disability of the child are the major factors in whether the low scores are found. For example, older children who have a disability in reading are probably identified by poor performance on a higher grade level test which emphasizes verbal comprehension. They are likely to show lower verbal than performance IQ because of the test used to identify the learning disability. In contrast younger children taking tests of basic word recognition are less likely to show lower verbal IQ. If a child's disability is in arithmetic, he is more likely to perform poorly on the Arithmetic section of the WISC. A particular pattern is often reported for reading-spelling disability cases on the ITPA: low automatic level in relation to representational level.

Specific test deficiencies such as Draw-a-person, Bender-Gestalt, Frostig, etc., are discussed under other more appropriate headings.

Clements reports that poor performance on block design and marble board tests are signs of minimal brain dysfunction. Difficulty with Block Design is identified with some of the minimally brain dysfunctioning because they resemble cases of known brain damage. There are children among the learning disabled who exhibit inability to perform well on Block Design but there are not enough to identify this test as a correlate of learning disorders, Marble board and unrelated measures, where patterns are copied using discrete units are not used in many learning disabilities studies, but there is evidence that the perceptual motor difficulties shown in copying a pattern (which often characterize learning disabilities) are much more severe and persist to an older age when the pattern must be perceived and reproduced with separate units.

Greater than normal variability in batteries of tests like the WISC is likely to occur in most of the very severe learning disability cases but not as frequently in those that are less severe. In some cases a child will be rated the equivalent of an IQ of 70 or below on a subtest when most of his test scores are the equivalent of an IQ above 100. Specific test deficits are likely to vary for different types of disabilities. Variability on the same measures over time occurs more frequently among learning disabilities, and is highly characteristic of some cases, but is not likely to characterize most learning disability cases. Disorders of speech and communications are partial definers of language disability, but mild hearing loss, mild speech irregularities (or a history of such difficulties), a history of delay in talking, and some impairment in auditory discrimination have all been found to be correlates of reading-spelling and other disabilities. While significantly correlated with learning disabilities, these variables are likely to occur in less than a third of the learning disability cases with auditory discrimination problems being found primarily among children with reading-decoding and spelling disabilities as well as language disability. Speech and hearing difficulties may not be significantly more frequent than normal except for cases of language disability.

Disorders of Thinking Processes

While this category includes defining variables, many other aspects of thinking disorders are considered as correlates. Poor comprehension of what is heard or read is clearly a defining variable of language disability. Difficulties in concept development have been discussed in a previous category. Beyond these variables, there are frequent clinical reports of disorganized thinking, trouble with abstract thinking, and memory deficits. While these reports suggest a correlate, they do not give any indication of how common the disorders are among different types of learning disability. Clearly auditory sequential memory as measured by digit span is frequently impaired among learning-disabled children. Sequential memory for visual forms is sometimes identified as a correlate though other times is not found to be correlated with learning disabilities. In some cases of learning disability, children are able to perform better on a test of drawing simple geometric figures from memory than copying them. Measures of memory for visual structure of words are contaminated by poor learning but in many cases of disability in word recognition, there seems to be a visual memory problem.

Measures of memory are difficult to interpret because inadequate initial learning may be reflected in forgetting and not in poor memory. Furthermore, memory must be studied not only in relation to modality but also in terms of long-short term duration, kind of use being made of the remembered material, and methods of retrieval.

There can be little doubt, however, that some memory functions are considered to be impaired in learning disabilities studies and clinical reports. Children have trouble remembering directions, the word to be spelled, the responses to simple paired-associate learning, and skill elements learned through remedial instruction. While all of these conditions may be a function of attention and learning rather than memory, there is clearly something impaired with the storage and retrieval system of most learning-disabled children in the areas of their disabilities and often in other areas.

Thought disturbance as reflected by projective tests (autistic thinking, pathognomic verbalization, etc.) are reported particularly for the immature and extremely confused child these variables do not seem to be a correlate for most learning disabilities. Climents does list it as a sign of minimal brain dysfunction. He also lists thought perseveration which again is reported in some cases but either is not considered in learning disability studies or else is not found to be a correlate. Grouped with Disturbances of Thinking Processes are the non-defining variables from Academic Achievement and Adjustment. The poor ability to organize work and confusion about instructions which he lists are frequently mentioned in studies and clinical reports of learning disabilities. Slowness in finishing work, which is listed under Academic Adjustment, is a common characterisitc of learning disabled children but whether it reflects too difficult a task, poor motivation, poor memory, or some other factor is not clear.

Clements lists Physical Characteristics and Variation of Physical Development as categories. The lags in developmental milestones of talking, walking, etc., have been covered in other sections and certainly are found as characteristic of many learning disabled children. General maturational lag has been considered as a possible etiological variable and does characterize a substantial number of learning disabled children. Depending upon how it is measured, it could be characteristic of most learning disability cases. Physical immaturity is noticeable in some instances, but not in a large percentage of learning disabled children.

Most of the other physical characteristics listed by Clements are noted occasionally in the learning disability literature but are not established as correlates either because they are not associated with learning disabilities or because studies no not consider them. These unsubstantiated variables include: excessive drooling, thumb sucking, nail-biting, head-banging, teeth grinding, in the young child. Also included are peculiar food habits, slowness in toilet training, easy fatigability, enuresis and encopresis. These latter variables cannot be considered as significant correlates of learning disabilities.

Clements' categories of Emotional Characteristics and Variations of Personality do not list the emotional factor most commonly reported for cases of learning disability, feelings of failure and low selfworth. These are present in the majority of learning disability children, probably as a result of the failure and disability. In addition, lack of emotional stability is often reported but it may also be an aspect of the reaction to failure and disability. Impulsiveness, explosive-rage reactions and low tolerance for frustration characterize a substantial number of learning disabled children but less than half show this behavior. Sensitivity to others and gullibility are not often identified as correlates of learning disability. Moodiness and poor adjustment to environmental change are sometimes cited but may be related to the sense of failure already mentioned. Teachers often comment upon the cooperativeness and sweet disposition of some learning-disabled children. It is likely that this is a compensating mechanism to their problems but it not frequent enough to establish it as a correlate. In general, the learning disabled child appears to be a little less stable in terms of emotional adjustment either as a result of his disability or as a result of neuropsychological factors that generate both the disability and the less stable emotional adjustment. He usually has feelings of failure. Since primary emotional difficulties are generally excluded from learning disabilities, most cases with causative emotional problems would not be included in studies of the disorder. These cases would not be excluded from the classification of minimal neurological dysfunction if there were also evidence of neuropsychological dysfunctioning.

The categories of Social Behavior and Relationship Capacities are much more extensive for minimal brain dysfunction than for learning disabilities.

A few studies and clinical reports suggest that some learning disabled children are less adequate in social relationships with their peers and others. Clearly this exists very noticeably for many cases but it is not often reported and does not appear to be a characteristic for the majority of learning disability children. If non-verbal disability becomes an area of learning problems, then poor judgement in social and interpersonal situations as well as inappropriate behavior, might become some of the defining variables for this subgroup.

Sleep Characteristics are sometimes mentioned in studies of learning disabilities but it is not established as a significant correlate.

The remaining category from Clements' Signs and Symptoms of minimal brain dysfunctioning is Specific Neurological Indicators.

While gross abnormalities are occasionally reported, studies in learning disabilities as well as studies in minimal brain dysfunctioning generally report no defects on standard neurological examinations. Normal sensations, reflexes, strength, and muscle tone are found to be symmetrical. (Clements reports frequent reflex assymmetry for minimal brain dysfunction but this is not often true for learning disabilities.) A few studies (e.g., Silver, 1952) report higher correlations between learning disabilities and neurological examinations. The examinations used in these studies are much broader than is usual in medical practice.

Many soft neurological signs have been discussed under other headings and include hyper- or hypokinesis, mild visual or hearing impairment, general awkwardness, poor visual-motor coordination, perceptual difficulties, and confusion of left-right. Mixed laterality (e.g., right handed-left eyed or other mixture of preference) is often reported among a third or half of LD cases while other studies find no difference between controls and learning disabled on this variable. Most of the studies reporting mixed laterality are clinical and probably involve more severe cases, but this variable is the source of so much disagreement in the field that its position as a correlate of learning disabilities is as yet unresolved.

EEG records of learning disabled children frequently find from 1/3 to 2/3 having minimal questionable, or borderline abnormalities, but few of these studies used controls and the electroencephalographer knew he was dealing with clinical cases. In other studies EEGs do not deviate much from the findings of control groups. It appears that descriptions such as diffuse cortical irritability and immature, borderline do characterize many learning-disabled children, but it is hard to interpret exactly what these minor deviations mean and substantial numbers of non-handicapped children also have such terms used to describe their EEG's. Particluar patterns such as 14 and 6 cycle per second positive spiking during sleep is sometimes reported for learning disabled children. However the meaning of such abnormal patterns is not clear and in one study that used a control group (Bryant and Friedlander, 1966) about 1/3 of the learning disabled cases showed this abnormality but so did an equal number of controls.

In general, there are many soft or suggestive neurologic indicators, including some unclear EEG findings for most learning-disabled children. However, there are very few cases with gross neurological abnormalities.

Two categories not considered as signs of minimal brain dysfunction are particularly important to learning disabilities. One is demographic correlates such as sex and SES and the other is Learning Performance. Most children with learning disabilities are boys and in studies of combined areas of disability and particularly in studies of reading-spelling disability, the ratio is usually four boys for every girl. The more severe the disability, the higher the proportion of boys. Clinics, where there may be a referral bias as well as a severity bias, may see ten boys for every girl. Girls with the same learning impairment as boys possibly have more associated disorders including lower intellectual level. Socioeconomic, cultural or racial factors are correlates of learning disabilities even though many children from environmentally disadvantaged backgrounds are excluded from the classification. Many children from disadvantages backgrounds do poorly on IQ tests and are excluded from learning disabilities for that reason. Nevertheless, in spite of these restrictions, there is probably a higher percentage of children with disorders in basic learning processes from disadvantaged backgrounds than from advantaged ones. The extent of this correlation cannot be determined because it depends upon the extent to which disadvantaged children are excluded from the learning disabled samples.

Learning Performance is seldom measured in studies of learning disabilities. Instead poor learning performance is inferred from poor achievement. The exceptions are reports of remedial instruction and non-standardized clinical observations. Sometimes children with very poor achievement can learn quite readily in an optimal learning situation. Relevant to this point is the earlier quote from Don Hammill to the effect that most learning-disabled children are able to learn using the same method and material on which they had previously failed if the instruction is started over and individualized a little more. In spite of the fact that learning disabled children can learn, they almost all have much more trouble than controls and not only in their area of disability but in paired-associate learning and in serial learning with non-academic materials. If studies were to examine the need of learning-disabled children with the material being learned, isolated and focused upon, presented in a very small increments, and practiced until automatic, it might be found that these variables are almost universal correlates. Clinical reports of remediation constantly refer to these points. Since many learning-disabled children do learn readily in remedial instruction, it may be that their disability is in terms of the small amount of learning that can occur at one time and the inability to learn several things at once. This is an important correlate or possibly a definer of learning disabilities since it provides direct suggestions for remedial instruction.

Correlates of learning disabilities are essentially similar to the correlates of minimal brain dysfunction but are broader and omit some of the extreme and very specific abnormalities. Most of the correlates of learning disabilities would be taken as signs of organicity by neurologists and psychologists.

While the correlates have been discussed individually, they usually occur together. Thus the child with severe learning disabilities is likely to be male with disorders of attention sometimes associated with a history of hyperactivity. He is likely to have perceptual-motor difficulties, frequently accompanied by clumsiness or other motor-development problems. He will be more variable on intelligence subtests than most children. Concept confusion, left-right confusion, and some memory problems are likely to be present. He will probably feel inadequate and have a sense of failure. A number of other correlates are also likely to be present. In the area of his disability he will not only be an underachiever, but he will probably be unsuccessful in learning unless he receives help in focusing upon what is to be learned, instruction in very small sequential steps, more than normal time or trials to accomplish each step, and specific practice in integrating and applying each newly learned skill element. Few children will show every one of these correlates but the majority will show several. Some children who are not learning disabled (particularly the borderline cases) will also show some of the correlates but they will tend to have less severe disorders in the correlates and fewer of them. The pattern of correlates may vary, particularly as the area of disability and the definition of that disability vary. However, there is a surprising agreement for major correlates across areas, in spite of differences in definitions.

Predictive Correlates

Many correlates of learning disabilities are present before the disability itself is apparent. In addition, delays and inconsistencies in the development of various abilities tend to be associated with later learning disabilities. Thus it is possible to identify children who have a higher risk than average of developing learning problems. There is much value in providing interventions to minimize the development of the disability, to circumvent the handicap by using compensating or alternate learning procedures, and to reduce the secondary effects of failure. Because prediction is not perfect, there is a danger that interventions of little value will be reinforced and become widely used in the field. Hence, children erroneously identified as future learning disability cases will not develop any learning problem and the intervention procedure used will be credited with preventing the development of the handicap. Equally misleading is the assumption that variables predicting learning disability have a causative relationship so that improvement in performance will result in partial prevention of the disability. This type of spurious thinking is apparent in many of the studies of early prediction and prevention. Nevertheless, prediction is a step in preventing the full development of a disability and the resultant secondary effects.

Prediction can be based upon most of the above correlates as well as etiological variables such as family history of a learning disability; prenatal toxemia, virus infection, bleeding; low birth weight and anoxia at birth; postnatal infection or trauma; poor nutrition; biochemical disorders; and possible severe long term emotional stress or learning impoverished environment. Chances are greater that a child will develop a learning disability if he has several of these variables in his history. Another etiological factor, maturational lag, is predictive but is dependent upon when the level of maturation is measured. If, just prior to entering school, a child is immature and seems much younger in terms of his cognitive processes and readiness for formal instruction, there is a high probability that he will have problems in school learning. However, development is very rapid around the six-year-old age range and exposure to formal instruction often modifies immature behavior causing these children to become adequately mature in half a year or sometimes even over a summer. Nevertheless, immature behavior and lag in development of cognitive and learning processes can be reliably judged by kindergarten teachers and is highly predictive of subsequent learning problems. This type of preduction is particularly relevant for prevention if an intervention such as delay in starting first grade, or a readiness program, reduces the chance of learning disability developing or minimizes its severity and effects.

Chronological age, related to maturational lag, is one of the most direct (though weak) predictors. It is the criterion of school admissions in two-thirds of U.S. public schools (Austin and Morrison, 1963), with six years being the usual starting age both in terms of administrative procedures and in the opinions of most educational authorities. Ages differ in other countries (e.g., Scotland starting children a year younger and Sweden starting children a year later). The current emphasis on early childhood education, universal kindergartens, and compensating education for the environmentally disadvantaged is a recognition of the fact that children of school age differ tremendously in their readiness to learn. Some children demonstrate their readiness by learning academic skills before starting school and without formal education (Durkin, 1961; Sutton, 1964). The lack of readiness of many children for formal school instruction is supported by the findings of various authors, and has been most specifically stated by Ilg and Ames (1965). In terms of general reading achievement, for example, older pupils perform slightly better than younger pupils at each grade level (Hampelman, 1953; Durrell, 1958; Barrett, 1965; Dykstra, 1966). In general, use of combined measures is better for predicting learning in younger children since the effects of immaturity are more evident (Jansky, 1970). Age seems to be a better predictive factor for boys than for girls. On a number of indices from bone age to social behavior, six year old girls are found to be more mature than boys of the same age. However, while chronological age has some slight preductive ability for school achievement, it is of little value by itself in predicting learning disabilities.

Mental age or intelligence occupies the peculiar position of being involved in defining a learning disability because the child's learning achievement is lower than would be expected for his intelligence. While dysfunctions occur at every level of intelligence, the very low are excluded as mentally retarded but even among those not excluded there is a tendency for lower scores to be associated with disabilities. The relationship between achievement and IQ is relatively high since this is what IQ tests predict. For example, reading achievement is usually found to correlate between .4 and .7 with IQ. Achievement in the earlier basic skills correlates lower than measures involving verbal intelligence since the latter assesses reading comprehension. There is a suggestion in the literature that IQ is more closely related to learning disability in basic reading skills in girls than it is in boys, in fact, prediction on a variety of measures seems to be different for boys than for girls (Jansky, 1970). In culturally different populations tests of IQ are more complex due to the influence from a greater variety of sources. It is difficult to elminate learning disability. A child with great variability on different intelligence tests is more likely to develop learning disabilities, but unless the variability is extreme this too is an ineffective predictor.

Prediction of reading and other learning disabilities have often used batteries of subtests, each of which is related to later achievement. An early battery to predict learning difficulties in reading is Marion Monroe's Reading Aptitude Test (1935) and it has been followed by dozens of reading readiness tests which are used with about 80% of school children before they are exposed formal reading instruction (Austin and Morrison, 1963). These tests such as the Gates-McGinitie Reading Readiness Test (1968), Metropolitan Reading Readiness Test (Hildreth and Griffitsh, 1965), Lee-Clark Reading Readiness Test (1962), and Murphy-Durrell (1965) are available from almost every test publisher. Such tests usually use letter and word matching, recognition, auditory perception, listening comprehension, auditory processing, visual motor ability and a variety of other subtests. Comparable subtests in different batteries (e.g., auditory discrimination) sometimes have only low correlations probably due to poor reliability of short subtests and the possibility that the items are measuring other variance besides what the test name implies.

Most reading readiness test correlate .40 to .60 with later achievement (Dykstra, 1967), but prediction is best at the upper end of the distribution. For children doing poorly on reading readiness measures, the prediction of subsequent achievement is lower (Fendric and McGlade, 1938). Bremer (1959) reports that one-third of children with low readiness scores achieve above average at the end of first grade. Rapid maturation and variation in response to formal instruction probably reduce the preductive value of readiness measures. A single measure of being able to name the letters of the alphabet predicts reading achievement just about as well as combinations of other test variables (Silvaroli, 1965). There is a high correlation (about .5 to .6) between previous knowledge of letters and early reading achievement (Bond and Dykstra, 1972; Wilson and Flemming, 1938; Olson, 1966; and Gavel, 1958). However this method may be less accurate in disadvantaged populations where children are not exposed to informal instruction in letter names. Teaching the names to children who are low on this test before they start school does not increase their subsequent reading achievement. What is probably predictive is the combination of background factors that expose the child to opportunities to learn the letter names, as well as his proficiency in learning incidentally from his environment.

Tests that are broader than reading readiness include predictive tests like the Slingerland Screening Tests for Specific Language Disability (1964), Detroit Test of Learning Aptitude (Baker and Leland, 1955), ITPA (Kirk, McCarthy and Kirk, 1968), Dyslexia Schedule (McLeod, 1968), Meeting Street School Screening Test (Hainsworth, 1969), Psychoeducational Inventory of Basic Learning Abilities (Valett, 1968) and many others to measure using language, motor, visual-perceptual-motor, auditory discrimination, previous learning intelligence, and trial learning performance.

Tests of visual discrimination may involve verbal materials (letters and words), non-verbal materials (pictures, geometric forms, etc.), or a combination of the two. Visual discrimination often involves orientation, shape differences, details within gestalts, figure-ground perception, and memory for forms. Prediction of first grade reading level is often as high as .6

Usually associated with the visual discriminations are perceptual motor functions such as pattern copying on the Bender-Gestalt or similar tests. Prediction of later reading success on these tests tends to be .4 to .6. Figure drawing, which brings in body concepts as well as motor functions, correlates with spelling and reading achievement.

Measures of auditory perception and of auditory memory or sequencing are frequently used and many authors including Monreo (1935), Buktenica (1968), Thompson (1966), and Murphy-Durrell (1965), report significant (.3 to .6) prediction of later reading achievement.

Difficulties in language development whether assessed by the ITPA, the Myklebust Picture Story Test, or by measures of listening comprehension, are predictive of learning disabilities and may even define a language disability. Children with extreme difficulties almost certainly have a learning disability in language and are likely to develop other dysfunctions. Moderate difficulties are one of the most common sources of variance among predictive tests (Haring and Ridgeway, 1967). Prediction, particularly when measuring language function, must take socioeconomic level, cultural differences, and presence of a non-school dialect into account.

Motor clumsiness, delay in walking and talking, poor lateralization, hyperactivity, various neurological signs and most of the variables discussed in the section on correlates have some prognostic value. Prediction of reading achievement with combinations of variables may correlate as high as .6 or .7 but studies often find lower correlation. Kindergarten and first grade teachers can also predict using their own judgements, and correlations are just as high (Wilson and Fleming, 1938; Henig, 1949; Kermonia, 1962; Cohen, 1963; Haring and Ridgeway, 1967).

Most studies have been in the area of reading achievement and these are thoroughly reviewed by deHirsch and others in the Report of the Interdisciplinary Committee on Reading Problems.

It is easier to predict achievement among entire populations of children than to identify a specific group at one end of the distribution. Those most likely to develop learning disabilities can be identified even though some of them will not develop the disorder. Furthermore, children least likely to develop learning disabilities can be recognized although a few will develop the disorder. The best combination of variables at the end of kindergarten will probably identify 1/2 to 3/4 of the children who later develop disabilities in basic academic skills, predominantly reading and spelling. However, a substantial number of children identified as high risk are likely to learn normally. Those identified as high risk are usually the most extreme cases of disability and therefore are those for whom prediction is most important. Thus prediction is useful but is uncertain when dealing with a specific case. The accuracy of prediction depends upon instructional factors as well as variations in criteria for identifying learning disabilities. Nevertheless, until learning disorder is operationally defined, it is almost impossible to establish the percent of false negatives and false positives using any particular combination of predictors.

OVERLAP OF SUBJECT VARIABLES

The child with one learning disability is likely to have a disability in one or more other areas. This may be due partly to the fact that any etiological factors resulting in neuropsychological dysfunctioning in one area are likely to do the same in other areas. Overlap of disabilities may also be due to the fact that underlying learning processes contribute to many different skills. The child is also likely to show a number of the correlates that are associated with learning disabilities. The interlocking of so many correlates and defining variables suggest that even with the variations in definition, most of the children identified as learning disabled show some degree of neuropsychological dysfunctioning, and that even though the nature of the dysfunctioning varies, there are some common aspects. Thus, while learning disability is a complex combination of different areas of impairment, there is considerable overlap among the disabilities themselves and among the etiological variables, causative dysfunctions, and correlates associated with them.

SUMMARY AND RECOMMENDATIONS

Learning disabilities is a young but rapidly developing field which still has considerable confusion about its scope and the children it serves. Developed as an attempt to serve handicapped children who did not fit previous special education categories, it has been shaped by federal funding and parental pressure. It has relatively poor coordination with other specialities such as remedial reading and speech correction whose responsibilities it partly seeks to absorb and general education which retains the responsibility for many learning-disability children. Two major thrusts generated the directions of the field and remain as major orientations. One is the work with the minimal brain dysfunctioning or neurologically impaired, and a large number of learning-disability specialists are primarily concerned with the neuropsychological dysfunctions underlying learning disabilities. The other orientation concerns itself with providing service to the large number of underachievers in basic academic skills. Those with this orientation are less concerned with underlying dysfunctions except as they suggest treatment. Many learning-disability specialists of this latter orientation lean toward defining learning disability as synonomous with educational handicap, and for purposes of effective service, some would consider most emotionally disturbed and mildly mentally retarded children as learning disability cases. The two orientations are not necessarily incompatable and as research enables disabilities to be accounted for by neuropsychological dysfunctions, they are likely to converge.

These differences in conceptualizing the field exist in spite of general agreement on the definition of learning disabilities provided by the National Advisory Committee on Handicapped Children (U.S. Office of Education) in January, 1968. The definition stresses disorders in basic psychological processes involved in understanding or using spoken or written language. It excludes learning problems primarily due to sensory handicaps, mental retardation, emotional disturbance or environmental disadvantage. The absence of operational criteria for this or other definitions limits meaningful studies of incidence, etiology, characteristics, treatment, and services. The major basis of identification in most studies is underachievement. With varying procedures and exclusions, studies suggest that while gross learning handicaps may exist in under five percent of the school population, that there is a continuum of neurological dysfunctioning in learning processes accompanied by significant underachievement that may range as high as 15% and that the term learning disabilities may be justified for 5-10% of the population. A large proportion of these learning disability cases could probably achieve adequately in a regular classroom if instruction were individualized to adjust to their handicap. Reconsideration of definition as to degree of severity in the handicap and in terms of need for special education procedures may dramatically reduce this incidence figure. Reconsideration of including disadvantaged children and some emotionally disturbed and mildly retarded cases may increase it. However, the large number of cases referred as possibly learning disabilities necessitates screening and assistance to general education in meeting the needs of mildly handicapped underachievers through individualized instruction and more effective programs for this group. This role of screening and consulting seems to fall to the learning-disability specialist. The interface with general education is an important factor in the future development of the field since effective regular class work with most underachievers might prevent the field of learning disabilities from becoming merely an arm of general education with an overwhelming case load.

Every learned behavior is a possible area of learning disability but the field has generally dealt with basic academic skills of reading, spelling, arithmetic, and handwriting and with the broad area of language disabilities (ranging from receptive and expressive aphasia to subtle disorders in listening or reading comprehension and in oral or written expression). Non-verbal learning problems are receiving increasing attention and may become another major area of learning disabilities. This emerging area is another element to be considered in developing an operational definition. At present, the great majority of articles and the majority of cases referred to in the learning-disability literature involve reading or reading-spelling disabilities. Attention to the other specific areas is relatively minor. Some correlates such as perceptual-motor skills receive more attention than any area of disability except reading.

The etiology of learning disability is not evident for many cases, but clearly genetic factors, pre-natal complications, birth difficulties, injury, and other factors are frequently associated with learning disabilities. Most learning disability can be predicted by means of correlates that are apparent early in life but many children will be identified as high risk who will not develop a disability.

While some elements in the field have become less focused on neuropsychological disorders and have concentrated upon underachievement, correlates of learning disability are essentially similar to those of minimal brain dysfunction but may be broader, some extreme impairments seldom being reported. Most of the correlates of learning disability would be taken as signs suggestive of organicity by many neurologists and psychologists.

Various disabilities are likely to occur together and, similarly, correlates tend to overlap. However, no pattern is always present. Thus the child with severe learning disabilities is likely to be a male with reading-spelling difficulties and possibly some evidence of disability in one or more other areas. He is likely to demonstrate disorders of attention sometimes associated with hyperactivity or a history of hyperactivity. He is likely to have perceptual-motor difficulties, frequently accompanied by clumsiness or other motor-development problems. In contrast, he may have language problems without visual-motor difficulties. He will probably be more variable on intelligence subtests than most children. Concept confusion, left-right confusion, and some memory problems are likely to be present. He will probably feel inadequate and have a sense of failure. A number of other correlates are also likely to be present. In the area of his disability, he will not only be an underachiever, but he will probably be unsuccessful in learning unless he receives help in focusing upon what is to be learned, receives instruction in very small sequential steps, is given more than normal time or trials to accomplish each step, and is provided with specific practice in integrating and applying each newly learned skill element.

The major need in the field is for an operational definition of learning disabilities that identifies homogeneous groups (to the extent that they exist) or dimensions of disabilities. The definition should use measures of learning in each disability area or dysfunctions in each process rather than inferring disability from underachievement and correlates. Programmatic research should be directed to this goal and is discussed in a later section.

It may be that eventually the operational criterion measures can be replaced by a series of tests of basic learning processes if these can be shown to account for nearly all the variance in measures of learning for each of the disability areas. To work toward this goal, a second major need is to develop and thoroughly test a model of learning disability and from it to develop measures of learning processes so that they validly reflect the model and almost completely differentiate various learning disabilities from each other and from the non-handicapped population.

The development of an operational definition of homogeneous groups or dimensions of disability and the development of measures of neuropsychological dysfunctions that account for different disabilities (1) would make it possible to study treatment-disability interactions and find the appropriate treatments for particular children; (2) would make it possible to plan the funding and administration of services at the federal, state and local school level; and (3) would enable studies to be carried out in etiology, prediction, prevention, correlates, relation of learning disabilities to other special education categories, regular classroom procedures for handicapped learners, etc. Until an operational definition of various learning disabilities is established, the field will make little progress in developing a scientific base for research, for treatment, or for services.

BIBLIOGRAPHY

Abilene Public Schools. Departmental guide, Special Education Department. Abilene, Texas: Special Education Department, 1966.

Abrams, J. C. A study of certain personality characteristics of non-readers and achieving readers. Dissertation Abstracts, 1956, 16, 377-78.

Ackerman, Peggy T. Children with specific learning disabilities: WISC profiles. Journal of Learning Disabilities, March 1971, 4, 150-166.

Adams, Pauline. Patterns of intellectual functioning in learning disability children and their siblings compared with successful students and their siblings. Bulletin of the Orton Society, 1968, XVIII, 40-48.

Adelman, Howard S. Learning problems: Part I: an interactional view of causality. Academic Quarterly, Winter 1970-1971, 6, 117-23. (a)

_______. The not-so-specific learning disability population. Exceptional Children, 1971, 37, 528-35. (b)

Adelman, H. and Feshback, S. Predicting reading failure: beyond the readiness model. Exceptional Children, 1971, 37, 349-54.

Adler, S. Dialectual differences: professional and clinical implication. Journal of Speech and Hearing Disorders, 1971, 37, 90-100. (a)

_______. A sociolinguistic approach to functional mental retardation. Exceptional Children, December, 1971, 38, 336-337. (b)

Aho, M. S. Teaching spelling to children with specific language disability. Academic Therapy Quarterly, Fall 1967, 3, 45-50.

Akins, K. A psychotherapeutic approach to reading retardation. Canadian Psychiatric Association Journal, 1967, 12, 497-503.

Alaska State Department of Education. Guidelines of programs of special education in Alaska. Juneau, Alaska: Alaska State Department of Education, 1966.

Allen, F. M. and Dickman, I. A pilot study of the immediate effectiveness of the Frostig-Horne Training Program with educable retardates. Exceptional Children, 1966, 33, 41-42.

Alexander, D., and Money, J. Reading disability and the problem of direction sense. The Reading Teacher, 1967, 20, 404-409.

Alexander, D., Walker, H., and Money, J. Studies in direction sense: I. Turner's Syndrome. Archives of General Psychiatry, 1964, 10, 337-339.

Alexander, E. B. The story of vision. Education, 1959, 79, 380-82.

Alper, Thelma, Garner, G., and Sperry, Bessie. Negative body referents in non-learning children compared to learning children. Unpublished research report, Judge Baker Guidance Center, 1966.

Alshan, L. M. Reading readiness and reading achievement. In J. A. Figurel (Ed.), *Reading and inquiry*. Newark, Delaware: International Reading Association, 1965. Pp. 312-13.

Altus, Grace. A WISC profile for retarded readers. *Journal of Consulting Psychology*, 1956, *20*, 155-57.

Alwitt, Linda F. Decay of immediate memory for visually presented digits among nonreaders and readers. *Journal of Educational Psychology*, 1963, *54*, 144-48.

Amante, Dominic. The epidemiological distribution of central nervous system dysfunction. *Journal of Social Issues*, 1970, *26*, 105-36.

The American Diet. *Nutrition and Stress Research Bulletin* No. 2, March, 1969.

Ames, Louise Bates. The development of the sense of time in the young child. *The Journal of Genetic Psychology*, 1946, *68*, 97-125.

_______. Academic promise in Negro primary school pupils. *Journal of Learning Disabilities*, October, 1968, *1*, 16-23.

_______. Learning disabilities: the developmental point of view. In H. Myklebust (Ed.), *Progress in learning disabilities*, Vol. *I*. New York: Grune and Stratton, 1968.

Ames, L. B. and Walker, R. N. Prediction of later reading from kindergarten Rorschach and I.Q. soores. *Journal of Educational Psychology*, 1964, *55*, 309-13.

Ames, W. The development of a classification scheme of contextual aids. *Reading Research Quarterly*, 1966, *2*, 57-82.

Anderson, I. H. Studies in the eye movement of good and poor readers. *Psychology Monograms*, 1937, No. 48, 1-35.

Anderson, Luleen. Clinical research on learning inhibitions in boys. Unpublished paper, presented at Hartley-Salmon Child Center, December 3, 1965.

Anderson, R. P. A neuro-psychogenic perspective on remediation of learning disabilities. *Journal of Learning Disabilities*, March 1970, *3*, 145-148.

Anderson, R. W. *Effects of neuro-psychological techniques on reading*. Doctoral dissertation, Colorado State College, 1965.

Anderson, S. A. and Beh, W. The reorganization of verbal memory in childhood. *Journal of Verbal Learning and Verbal Behavior*, 1968, *7*, 1049-1053.

Anderson, William and others. *San Mateo County pilot study of neurologically handicapped children*. December, 1966

Anthony, E. J. Learning difficulties in childhood. *Journal of the American Psychoanalytic Association*, 1961, *9*, 124-134.

Apgar, V., Girdany, B. R., McIntosh, R., and Taylor, H. C. Neonatal anoxia: I. A study of the relation of oxygenation at birth to intellectual development. *Pediatrics*, 1955, *15*, 653-661.

Arieti, A. (Ed.) *American Handbook of Psychiatry*, 3 vols. New York: Basic Books, 1959-1966.

Ashlock, P. The visual perception of children in the primary grades and its relation to reading performance. *Journal of Reading*, 1966, *9*, 300-301.

Ashlock, P. and Stephan, A. *Educational therapy in the elementary school, an educational approach to the learning problems of children*. Springfield, Illinois: Charles C. Thomas, 1966.

Athey, J. Affective processes in reading. In H. Singer and R. B. Ruddell (Eds.), *Theoretical models and processes of reading*. Newark, Delaware: International Reading Association, 1970. Pp. 98-119.

_______. Language models and reading. In F. Davis (Ed.), *The literature of research in reading with emphasis on models*. New Brunswick, New Jersey: Graduate School of Education, Rutgers, 1971.

_______. Synthesis of papers on language development and reading. *Reading Research Quarterly*, Fall 1971, *7*, 9-15.

Austin, Mary C. *The torch lighters: tomorrow's teachers of reading*. Cambridge, Massachusetts: Harvard University Press, 1961.

Austin, Mary C. and Morrison, Coleman. *The first R: the Harvard report on reading in the elementary school*. New York: Macmillan, 1963.

Avakian, S. A. The applicability of the Hunt-Minnesota Test for organic brain damage to children between the ages of ten and sixteen. *Journal of Clinical Psychology*, 1961, *17*, 45-49.

Axline, V. *Play therapy*. Boston: Houghton-Mifflin, 1947.

Ayres, A. J. *The Ayres Space Test*. Western Psychological Services, 1962.

_______. Tactile Functions: their relation to hyperactive and perceptual-motor behavior. *American Journal of Occupational Therapy*, 1964, *18*, 6-11.

_______. *Effect of sensori-motor actions on perception and learning in neurologically handicapped children*. Final Progress Report. Los Angesles: University of Southern California, 1971.

Ayers, Floyd William. *Central nervous system functions in children with reading problems*. Unpublished doctoral dissertation, 1968.

Baer, P. E. Problems in the differential diagnosis of brain damage and childhood schizophrenia. *American Journal of Orthopsychiatry*, 1961, *31*, 728-738.

Bagford, J. Reading readiness scores and success in reading. *The Reading Teacher*, 1968, *21*, 324-28.

Bailey, Maureen A. *Toxemia of pregnancy--cognitive and emotional effects in children from consistent and non-consistent environments*. Unpublished doctoral dissertation, 1970.

Baker, Harry J. *Exceptional Children*. Third Edition. New York: MacMillan, 1959.

Baker, H. J. and Leland, B. *Detroit Test of Learning Aptitude*. Public School Publishing Co., 1955.

Balow, Bruce. Perceptual-motor activities in the treatment of severe reading disability. *Reading Teacher*, March, 1971, *24*, 513-25.

Balow, Irving H. and Balow, Bruce. Lateral dominance and reading achievement in the second grade. *American Educational Research Journal*, 1964, *1.3*, 139-43.

Banas, Norma and Wills, I. H. The associative memory link. *Teaching Exceptional Children*, Winter 1971, *3*, 67-69.

Bandura, A. Behavioral modification through modeling procedures. In L. Krasner and L. Ullman (Eds.), *Research in behavior modification*. New York: Holt, Rinehart, and Winston, 1965.

Bangs, T. E. Evaluating children with language delay. *Journal of Speech and Hearing Disorders*, 1961, *26*, 6-18.

Bannatyne, Alex D. A comparison of visuo-spatial and visuo-motor memory for designs and their relationship to other psycholinguistic variables. *Journal of Learning Disabilities*, September 1969, *2*, 451-466.

_______. The etiology of dyslexia and the color phonic system. International approach to learning disabilities of children and youth. Selected Conference Papers. Tulsa, Oklahoma, 1965. Pp. 67-80.

_______. *Language, reading and learning disabilities*. Springfield, Illinois: Charles C. Thomas, 1971.

Bannatyne, A. D. and Wichiarajote, R. Hemispheric dominance, handedness, mirror imaging and auditory sequencing. *Exceptional Children*, 1969, *35*, 37-39.

Barakat, M. K. A factorial study of mathematical abilities. *British Journal of Psychology*, 1951, *4*, 137-156.

Baratz, Joan. Teaching reading in an urban Negro school system. In Joan Baratz and Roger Shuy (Eds.), *Teaching black children to read*. Washington, D. C.: Center for Applied Linguistics, 1969.

Baratz, Joan and Shuy, R. W. (Eds.) *Teaching black children to read*. Washington, D. C.: Center for Applied Linguistics, 1969.

Barbe, Walter B. *The exceptional child.* Washington, D. C.: Center for Applied Research, 1963. P. 78.

Bar-Hillel, Y. *Language and information*. Reading, Mass.: Addison-Wesley, 1964.

Barger, W. C. An experimental approach to aphasic and non-reading children. *American Journal of Orthopsychiatry*, 1953, 23, 158-170.

———. Late reading in children: a review of its origins with a discussion of a correcting device for the aphasic type. *Cerbral Palsy Bulletin*, 1959, *7*, 20-26.

Barndt, R. J. and Johnson, D. M. Time orientation in delinquents. *Journal of Abnormal and Social Psychology*, 1955, *51*, 343-45.

Barrett, T. C. The relationship between measures of pre-reading visual discrimination and first grade reading achievement: a review of the literature. *Reading Research Quarterly*, 1965, *1.1*, 51-76. (a)

———. Visual discrimination tasks as predictors of first grade reading achievement. *The Reading Teacher*, 1965, *18*, 276-82. (b)

Barry, H. *The young aphasic child: evaluation and training*. Washington, D. C.: Alexander Graham Bell Association for the Deaf, 1961.

Barsch, Ray H. Learning disabilities--yesterday, today, and tomorrow. *Exceptional Children*, December, 1964, *31*, 167-77.

———. *The Illinois tests of psycholinguistic abilities in current research: summaries of studies*. Urbana: University of Illinois Press, 1965.

———. Achieving perceptual-motor efficiency--a space oriented approach to learning. *Perceptual-Motor Curriculum*. Vol *I*. Seattle: Special Child Publications, 1966. (a)

———. Learning disorders. *Review of Educational Research*, February, 1966, *36*, 93-119.

———. *Learning disabilities: a statement of position*. Washington, D. C.: Division for Children with Learning Disabilities, CEC, NEA, 1967. (a)

———. *A space-oriented approach to learning*. Seattle, Washington: Special Child Publications, 1967. (b)

———. Implications of a learning disability approach for teaching educable retardates. *Mental Retardation*, 1967, *5*, 23-25. (c)

———. Three approaches to diagnosis and educational planning for children with learning disabilities. *Academic Therapy Quarterly*, Summer 1967, *2*, 215. (d)

Bartin, Norma. *Intellectual and psycholinguistic characteristics of three groups of differentiated third grade readers*. Unpublished doctoral dissertation, 1971.

Baumann, M. C., Ludwig, F. A., Alexander, R. H., Bergin, T. C., and Rauch, A. E. *A five-year study of brain damaged children*. Springfield: Springfield Mental Health Center, 1962.

Bay, E. Aphasia and conceptional thinking. In L. Halpern (Ed.), *Problems of dynamic neurology*. Jerusalem: Hebrew University, 1963. Pp. 1-12.

Beam, W. J. The isolation of some psychometric indices of severe-reading disability. Unpublished doctoral dissertation, 1971.

Beck, H. S. Detecting psychological symptoms of brain injury. Exceptional Children, 1961, 27, 59-63.

_______. The relationship of symbol reversal to monocular and binocular visions. Peabody Journal of Education, 1960, 28, 137-42.

Beery, Judith W. Matching of auditory and visual stimuli by average and retarded readers. Child Development, September 1967, 38, 827-33.

Beery, Keith E. Developmental test of visual-motor integration: administration and scoring manual. Chicago: Follett, 1967. (a)

_______. Preschool prediction and prevention of learning disabilities. San Rafael, California: Marin County Superintendent of Schools Office, March 1967. (b)

Beery, K. E. and Buktenica, N. A. Developmental test of visual-motor integration. Chicago: Follet, 1967.

Belmont, L. and Birch, H. G. The relation of time of life to behavioral consequence in brain damage: I. The performance of brain-injured adults on the marble board test. Journal of Nervous Mental Disorders, 1960, 131, 91-7.

_______. The intellectual profile of retarded readers. Perceptual and Motor Skills, June 1966, 22, 787-816.

Belmont, L., Birch, H., and Karp, E. The disordering of intersensory and intrasensory integration by brain damage. Journal of Nervous and Mental Diseases, 1965, 141, 410-418.

Belmont, J. M. and Butterfield, E. C. The relations of short-term memory to development and intelligence. In L. P. Lipsitt and H. W. Reese (Eds.), Advances in child development and behavior. 4. New York: Academic Press, 1969.

Benaron, H. B. W., Tucker, B. E., Andrews, J. P., Boshes, B., Cohen, J., Fromm, E., and Yacorzynski, G. K. Effect of anoxia during labor and immediately after birth on the subsequent development of the child. American Journal of Obstetrics and Gynocology, 1960, 80, 1129-1142.

Bender, Lauretta. A visual motor Gestalt test and its clinical use. New York: The American Orthopsychiatric Association, 1938.

_______. Neuropsychiatric contributions to the mental hygiene problems of the exceptional child. Mental Hygiene, 1942, 26, 617-30.

_______. Post-encephalitic behavior disorders in childhood. In J. Neal (Ed.), Encephalitis: a clinical study. New York: Grune and Stratton, 1942. (b)

_______. Psychological problems of children with organic brain disease. American Journal of Orthopsychiatry, 1949, 19, 404-441.

_______. The psychological treatment of the brain damaged child. *Quarterly Journal of Child Behavior*, 1951, *3*, 323-333.

_______. *Child psychiatric techniques*. Springfield: Charles C. Thomas, 1952.

_______. *Aggression, hostility, and anxiety in children*. Springfield: Charles C. Thomas, 1953. P. 25.

_______. Problems in conceptualization and communication in children with developmental alexia. In P. H. Hock and J. Zubin (Eds.), *Psychopathology of communication*. New York: Grune and Stratton, 1958. Pp. 155-76.

_______. *Psychopathology of children with organic brain disorders*. Springfield: Charles C. Thomas, 1959.

_______. The brain and child behavior. *Archives of General Psychiatry*, 1961, *4*, 531-547.

_______. Neuropsychictric disturbances. In A. H. Keeney and V. T. Keeney (Eds.), *Dyslexia*. St. Louis: C. V. Mosby, 1968. Pp. 42-48.

Bender, Lauretta and Silver, A. A. Body image problems of the brain damaged child. *Journal of Social Issues*, Fall 1948. Pp. 84-89.

Bennett, C. C. An inquiry into the genesis of poor reading. *Education*, 1938. Teacher's College Contributions, No. 755.

Benton, A. L. Mental development of prematurely born children. *American Journal of Orthopsychiatry*, 1940, *10*, 719-746.

_______. *Right-left discrimination and finger localization*. New York: Hoebler, Inc., 1959.

_______. Behavioral indices of brain injury in school children. *Child Development*, 1962, *33*, 199-208. (a)

_______. Dyslexia in relation to form perception and directional sense. In J. Money (Ed.), *Reading Disability*. Baltimore: Johns Hopkins Press, 1962. (b)

_______. Right-left discrimination. *Pediatric Clinics of North America*, 1968, *15*, 747-58.

_______. *Contributions to clinical neuropsychology*. Chicago: Aldine, 1969.

Benton, A. L., Hutcheon, J. F., and Seymour, E. Arithmetic ability, finger localization capacity and right-left discrimination in normal and defective children. *American Journal of Orthopsychiatry*, 1951, *21*, 756-766.

Benton, A. L. and Bird, J. W. The EEG and reading disability. *American Journal of Orthopsychiatry*, 1963, *33*, 529-31.

Benton, A. L. and Joynt, R. Reaction time in unilateral cerebral disease. *Confinia Neurologica*, 1959, *19*, 247-256.

Benton, C. D. Dyslexia and dominance. *Journal of Pediatric Ophthalmology*, 1965, *2*, 53-57.

Bentyen, Frances. Sex ratios in learning and behavior disorders. *American Journal of Orthopsychiatry*, 1963, *33*, 92-98.

Bereiter, C., and Englemann, S. *Teaching disadvantaged children in the preschool*. Englewood Cliffs, New Jersey: Prentice-Hall, 1966.

Berko, M. J. Mental evaluation of the aphasic child. *American Journal of Occupational Therapy*, 1951, *5*, 241-246.

_______. A note on psychometric scatter as a factor in the differentiation of exogenous and endogenous mental deficiency. *Cerebral Palsy Review*, 1955, *16*, 16-18.

Berman, H. H., Albert-Gasorck, K. E., and Reiss, M. Gonadal immaturity as an etiological factor in some forms of mental deficiency, and its therapy. *Diseases of the Nervous System*, 1959, *20*, 106-110.

Berner, G. and Berner, D. Relation of ocular dominance, handedness and the controlling eye in binocular vision. *Archives of Ophthalmology*, 1953, *50*, 603.

Berstein, Basil. Aspects of language and learning in the genesis of the social process. *Journal of Child Psychology*, 1961, *2*, 313-24.

Berry, M. *Language disorders of children*. New York: Appleton-Century-Crofts, 1969.

Best, Helen, and others. *The effect of structured physical activity on the motor skill development of children with learning disabilities*. University of Memphis, September, 1969.

Betts, E. A. *Foundations of reading instruction*. New York: American Book, 1946.

Bever, T. G. The cognitive basis for linguistic structures. In J. R. Hayes (Ed.), *Cognition and the development of language*. New York: Wiley and Sons, 1970.

Bijou, S. W. Problem of pseudo-feeblemindedness. *Journal of Educational Psychology*, 1945, *45*, 321-331.

Bijou, S. W. and Werner, H. Language analysis in brain injured and non-brain injured children. *Journal of General Psychology*, 1945, *66*, 239-254.

Bills, R. Non-directive play therapy for poor readers. *Journal of Consulting Psychology*, 1950, *14*, 140-149.

Birch, H. G., Editor. *Brain damage in children: the biological and social aspects*. Baltimore: Williams and Wilkins Co., 1964.

_______. Social differences in auditory perception. *Perceptual and Motor Skills*, 1965, *20*, 861-70.

Birch, H. G. and Belmont, L. The relation of time of life to behavioral consequence in brain damage: II. The organization of tactual form experience in brain-injured adults. *Journal of Nervous Mental Disorders*, 1960, *137*, 489-498.

_______. Auditory-visual integration in normal and retarded readers. American Journal of Orthopsychiatry, October 1964, 34, 852-61. (a)

_______. Perceptual analysis and sensory integration in brain damaged persons. Journal of Genetic Psychology, 1964, 105, 173-179. (b)

_______. Auditory-visual integration in brain-damaged and normal children. Developmental Medicine and Child Neurology, 1965, 7, 135-144. (a)

_______. Auditory-visual integration, intelligence, and reading ability in school children. Perceptual and Motor Skills, 1965, 20, 295-305. (b)

_______. Lateral dominance, lateral awareness and reading disability. Child Development, 1965, 36, 57-71. (c)

Birch, H. G. and Gussow, J. D. Disadvantaged Children. New York: Grune and Stratton, 1970.

Birch, H. G. and Lefford, A. Intersensory development in children. Monographs of the Society for Research in Child Development, 1963, 28, 5.

Black, William F. An investigation of intelligence as a causal factor in reading problems. Journal of Learning Disabilities, March 1971, 4, 139-42.

Blackburn, H. L. and Benton, A. L. Simple and choice reaction time in cerebral disease. Confinia Neurologica, 1955, 15, 327-328.

Blanchard, P. Psychoanalytic contributions to the problem of reading disabilities. Psychoanalytic Study of the Child, 1946, 2, 163-87.

_______. Psychogenic factors in some cases of reading disability. American Journal of Orthopsychiatry, 1935, 5, 361-74.

Blank, Marion and Bridger, Wagner. Deficiencies in verbal labeling in retarded readers. American Journal of Orthopsychiatry, October, 1966, 36, 840-47.

_______. Perceptual abilities and conceptual deficiencies in retarded readers. In J. Zubin and G. A. Jervis (Eds.), Psychopathology of Mental Development. New York: Grune and Stratton, 1968. Pp. 401-12.

Blau, T. H. and Schaffer, R. E. The Spiral Afteraffect Test (SAET) as a predictor of normal and abnormal electroencephalographic records in children. Journal of Consulting Psychology, 1960, 24, 35-42.

Bledsoe, J. C. Self-concepts of children and their intelligence, achievements, interests, and anxiety. Journal of Individual Psychology, 1964, 20, 55-58.

Bliesmer, E. D. A study of relationships among tests of reading readiness, teachers' predictions, test intelligence, and reading achievement. MA thesis, College of Education, State University of Iowa, 1951.

_______. A comparison of results of various capacity tests used with retarded readers. Elementary School Journal, 1956, 56, 400-412.

Bloom, Richard D. Learning to read: an operant perspective. In F. Davis (Ed.), *The literature of research in reading with emphasis on models.* New Brunswick, New Jersey: Graduate School of Education, Rutgers, 1971.

Blumberg, Harris M. The associative learning and memory span abilities of brain-injured youngsters. *Academic Therapy Quarterly*, Summer 1968, *3*, 272-273.

Blumental, A. L. *Language and psychology: historical aspects of psycholinguistics.* New York: Wiley, 1970.

Boat, B. H. and Clifton, C., Jr. Verbal mediation in four-year-old children. *Child Development*, 1968, *39*, 505-514.

Boder, Elena. Developmental dyslexia: prevailing diagnostic concepts and a new diagnostic approach. In H. Myklebust (Ed.), *Progress in learning disabilities. II.* New York: Grune and Stratton, 1971.

Boehm, Ann E. *Boehm Test of Basic Concepts.* Psychological Corp., 1969.

Boll, T. J., and Reitan, R. M. Comparative ability of inter-relationships in normal and brain-damaged children. *Journal of Clinical Psychology*, 1972, *2*, 152-156.

Bolman, W. M. An outline of preventive psychiatric programs for children. *Archives of General Psychiatry*, 1967, *17*, 5-8.

Bond, G. L. and Dykstra, R. *Coordinating center for first grade reading instruction programs.* Final Report. Project No. X-101, U. S. Department of Health, Education and Welfare. Minneapolis: University of Minnesota, 1967.

_______. The cooperative research program in first grade reading instruction. *Reading Research Quarterly*, 1972, *4*, 5-142.

Bond, G. and Fay, Leo. A comparison of the performance of good and poor readers on the individual items of the Stanford-Binet. *Journal of Educational Research*, 1950, *43*, 475-479.

Bond, G. and Tinker, M. *Reading Difficulties: their diagnosis and correction.* 2nd Edition. New York: Appleton-Century-Crofts, 1967.

Boring, E., Langfeld, H. S., and Weld, H. P. *Foundations of psychology.* New York: John Wiley and Sons, Inc., 1948.

Boshes, B., and Myklebust, H. R. A neurological and behavioral study of children with learning disorders. *Neurology*, January 1964, *14*, 7-12.

Bougere, Marguerite B. Selected factors in oral language related to first-grade reading achievement. *Reading Research Quarterly*, 1969, *5*, 31-58.

Bower, E. *Early identification of emotionally handicapped children in schools.* 2nd edition. Springfield, Illinois: Charles C. Thomas, 1969.

Bower, E. and Lambert, N. *A process of in-school screening of children with emotional handicaps.* Sacramento: California State Department of Education, 1961.

Bowers, Norman E. *The development and application of a set of criteria for use in the establishment of a comprehensive regional special education program.* Unpublished doctoral dissertation, 1970.

Bradley, C. The behavior of children receiving benzedrine. *American Journal of Psychiatry*, 1937, *94*, 577-85.

________. Organic factors in the psychopathology of childhood. In P. H. Hock and J. Zubin (Eds.), *Psychopathology of Childhood*. New York: Grune and Stratton, 1955. Pp. 82-104.

Braun, Jean. Relation between concept formation ability and reading achievement at three developmental levels. *Child Development*, 1963, *34*, 675-682.

Bremer, N. D. Do readiness tests predict success in reading? *Elementary School Journal*, 1959, *59*, 222-24.

Brewer, William F., Jr. *Paired-associate learning of dyslexic children*. Unpublished doctoral dissertation, 1968.

Brooks, Nelson. *Language and language learnings.* 2nd Edition. New York: Harcourt, Brace and World, 1964.

Brower, J. F. and Brower, D. Relation between temporal judgement and social competence in the feebleminded. *American Journal of Mental Deficiency*, 1947, *51*, 619-623.

Broadbent, D. The role of auditory localization in attention and memory span. *Journal of Experimental Psychology*, 1954, *47*, 191-196.

________. Immediate memory and simultaneous stimuli. *Quarterly Journal of Experimental Psychology*, 1957, *9*, 1-11.

________. *Perception and communication*. London: Pergamon Press, 1958. (a)

________. Effects of noise on an intellectual task. *Journal of the Accoustical Society of America*, 1958, *30*, 824-827. (b)

Brown, E. R. Basis of reading acquisition. *Reading Research Quarterly*, 1970, *6*, 49-74.

Brown, R. W. *Words and things*. Glencoe, Illinois: Free Press, 1958.

Brown, R. W. and Hanlon, C. Derivational complexity and order of acquisition in child speech. In J. R. Hayes (Ed.), *Cognition and the development of language*. New York: Wiley, 1970.

Bruecknev, L. J. and Bond, G. L. *Diagnosis and treatment of learning difficulties*. New York: Appleton-Century-Crofts, 1955.

Bruininks, Robert. Teaching word recognition to disadvantaged boys. *Journal of Learning Disabilities*, 1970, *3*, 30-39.

Bruininks, Robert and Weatherman, R. F. *Handicapped children and special education program needs in northeast Minnesota.* University of Minnesota: Department of Special Education, 1970.

Bruner, J. S., Goodnow, J. J., and Austin, M. *Studies in cognitive growth.* New York: Wiley, 1966.

Bryan, A. I. Organization of memory in young children. *Archives of Psychology,* 1934, No. 162.

Bryan, Q. Relative importance of intelligence and visual perception in predicting reading achievement. *California Journal of Educational Research,* 1964, *15*, 44-49.

Bryant, N. Dale. Reading disability: part of a syndrome of neurological dysfunctioning. In J. Figurel (Ed.), *Challenge and experiment in reading.* New York: Scholastic Magazine Press, 1963.

_______. Characteristics of dyslexia and their remedial implications. *Exceptional Children,* December, 1964. (a)

_______. Some conclusions concerning impaired motor development among reading disabilitiy cases. *Bulletin of the Orton Society*, 1964, *14*, 16-17. (b)

_______. Some principles of remedial instruction for dyslexia. *Reading Teacher,* April, 1965, *19*, 567-72.

Bryant, N. Dale and Frielander, W. J. "14 and 6" in boys with specific reading disability. *Electroencephholography and clinical neurophysiology*, 1966.

Budoff, M. and Quinlan, D. Reading progress as related to visual and aural learning in the primary grades. *Journal of Educational Psychology*, 1964, *55*, 247-252.

Buktenica, N. A. Perceptual mode dominance: an approach to assessment of first grade reading and spelling. In *Proceedings, 76th Annual Convention.* Washington, D. C.: American Psychological Association, 1968. Pp. 85-86.

Bumgarner, Dora Jean. *A comparison of the multimedia and corrective approaches to teaching remedial reading.* Unpublished doctoral dissertation, 1969.

Burch, Charles W. *Assessment variables relevant to the referral and placement of pupils in educationally handicapped class.* Unpublished doctoral dissertation, 1969.

Burkholder, Rachel. *The improvement in reading ability through the development of specific underlying or associated mental abilities.* Unpublished doctoral dissertation, 1968.

Burks, H. The effect of brain pathology on learning. *Exceptional Children*, 1957, *24*, 169-172.

_______. Effects of amphetamine therapy on hyperkinetic children. *Archives of General Psychiatry*, 1964, *11*, 604-609.

Burks, Harold and Bruce, Paul. The characteristics of good and poor readers as disclosed by the WISC. *Journal of Educational Psychology*, 1955, *46*, 448-494

Burt, C. The inheritance of mental ability. *American Psychologist*, 1958, *13*, 1-15.

Burt, C. and Howard, M. The relative influence of heredity and environment on assessments of intelligence. *British Journal of Statistical Psychology*, 1957, *10*, 99-104.

Calfee, R. C. and Jameson, P. Visual search and reading. *Journal of Educational Psychology*, 1971.

California State Department of Education. *Report on operation and results of special educational programs for educationally handicapped minors*. Sacramento: California State Department of Education, 1967.

Camp, W. and Lathen, L. A successful classroom program for emotionally disturbed children. *Training School Bulletin*, 1967, *64*, 31-38.

Campanelli, Peter. Sustained attention in brain-damaged children. *Exceptional Children*, January 1970, *36*, 317-23.

Campbell, W. A. B., Cheeseman, E. A., and Kilpatrick, A. W. The effects of neonatal asphyxia on physical and mental development. *Archives of Disabled Children*, 1950, *25*, 351-359.

Campion, G. S. Visual problems and reading disorder. In R. M. Flower and others (Eds.), *Reading Disorders*. Philadelphia: F. A. Davis, 1965.

Caplan, G. (Ed.) *Prevention of mental disorders in children: Initial exploration*. New York: Basic Books, 1961.

Carlson, P. V. and Greenspoon, M. K. The uses and abuses of visual training for children with perceptual-motor learning problems. *American Journal of Optometry* and *Archives of the American Academy of Optometrists*, 1968, *45*.5.

Carmichael, L., Hogan, H. P., and Walter, A. A. An experimental study of the effect of language on the representation of visually perceived form. *Journal of Experimental Psychology*, 1932, *15*, 76-86.

Carroll, J. B. An operational model for language behavior. *Anthropological Linguistics*, 1959, *1*, 37-54.

_______. Language and thought. Englewood Cliffs, New Jersey: Prentice-Hall, 1964. (a)

_______. The analysis of reading instruction: perspectives from psychology and linguistics. In E. R. Hilgard (Ed.), *Sixty-third yearbook of the National Society for the Study of Education*. Part I. Chicago: University of Chicago Press, 1964. (b)

_______. Words, meanings, and concepts. *Harvard Educational Review*, 1964, *34*, 178-202. (c)

_______. Some neglected relationships in reading and language learning. *Elementary English*, 1966, *43*, 577-582.

_______. The nature of the reading process. In E. O. Calkins (Ed.), *Reading Forum*. Monograph No. 11. National Institute of Neurological Diseases and Stroke, 1970.

Carroll, M. W. Sex differences in reading readiness at the first grade level. *Elementary English*, 1948, *25*, 350-375.

Carrow, Sister Mary Arthur. The development of auditory comprehension of language structure in children. *Journal of Speech and Hearing Disorders*, May 1968, *33*, 99-111.

Carter, John L. *Effects of visual and auditory background on reading achievement test performance of brain-injured and non-brain-injured children*. Washington, D. C.: Office of Education (DHEW), August, 1969.

Castner, B. M. Prediction of reading disability prior to first grade entrance. *American Journal of Orthopsychiatry*, 1935, *15*, 375-87.

Cattell, R. B. Theory of fluid and crystallized intelligence: a critical experiment. *Journal of Education Psychology*, 1963, *54*, 1-22.

Celebre, Gerald. *Psycholinguistic abilities associated with relative level of personality adjustment in primary school-age children with minimal brain dysfunction*. Unpublished doctoral dissertation, 1971.

Chalfant, James and Flathouse, Virgil E. Auditory and visual learning. In H. Myklebust (Ed.), *Progress in learning disabilities*. *II*. New York: Grune and Stratton, 1971.

Chalfant, J. D. and Scheffelin, Margaret. Central processing dysfunction syndromes in children through profile analysis. *Journal of Consulting and Clinical Psychology*, 1972, *2*, 251-60.

Chall, Jeanne. *Learning to read: the great debate*. New York: McGraw-Hill, 1967.

Chall, Jeanne, Roswell, Florence G., and Blumenthal, Susan H. Auditory blending ability: a factor in success in beginning reading. *Reading Teacher*, 1963, *17*, 113-18.

Chang, T. M. C. and Chang, V. Relation of visual-motor skills and reading achievement in primary grade pupils of superior ability. *Perceptual and Motor Skills*, 1967, *24*, 51-53.

Cheek, Claude W. *Electrosystagmography (ESG) in children in specific learning disability*. Unpublished doctoral dissertation, 1970.

Cherry, E. C. Some experiments on the recognition of speech, with one and with two ears. *Journal of the Acoustical Society of America*, 1953, *25*, 975-979.

Chomsky, C. Reading, writing, and phonology. *Harvard Educational Review*, 1970, *40*, 287-309.

Chomsky, N. A. *Language and mind.* New York: Harcourt, Brace, and World, 1968.

Chomsky, N. A. and Halle, M. *The sound pattern of English.* New York: Harper and Row, 1968.

Chow, B. F., Blackwell, R. Q., Blackwell, B. N., and others. Maternal nutrition and metabolism of the offspring: studies in rats and man. *American Journal of Public Health*, 1968, *58*, 668-77.

Christine, D. and Christine, C. The relation of auditory discrimination to articulatory defects and reading retardation. *Elementary School Journal*, 1964, *65*, 97-100.

Chuks, Thomas Margum II. *A comparison of the performance of normal and dyslexic readers on the auditory test of diabotic stimuli and the visual test of diabotic stimuli.* Unpublished doctoral disseration, 1968.

Clark, Willis W. Boys and girls--are there significant ability and achievement differences? In Crow and Crow (Eds.), *Readings in child and adolescent psychology.* New York: David McKay, Co., 1959.

Clemens, R. Minimal brain damage in children, an interdisciplinary problem. *Children*, 1961, *8*, 179-83.

Clements, S. D. *Minimal brain dysfunction in children, Phase I.* NINDB Monograph No. 3. Washington, D. C.: U. S. Department of Health, Education and Welfare, 1966.

________. *Minimal brain dysfunction in children, Phase II.* N and SDCP Monograph. Washington, D. C.: U. S. Department of Health, Education and Welfare, 1969.

Clements, S. D., Lehtinen, Laura, and Lukens, J. *Children with minimal brain injury.* Chicago: National Society for Crippled Children and Adults, 1963. P. 2.

Clements, S. D. and Peters, J. E. Minimal brain dysfunctions in the school-age child. *Archives of General Psychiatry*, 1960, *6*, 185-197.

Clowes, H. The reading clinic. *Elementary English Review,* 1930, *7*, 98-101.

Cobrinik, L. Performance of brain-injured children on hidden-figure tasks. *American Journal of Psychology*, 1959, *72*, 566-571.

Cohen, G. A comparison of semantic, acoustic, and visual criteria for matching of word pairs. *Perception and Psychophysics*, 1968, *4*, 203-204.

________. Some evidence for parallel comparisons in a letter-recognition task. *Quarterly Journal of Experimental Psychology*, 1969, *21*, 272-279.

Cohen, R. I. Remedial training of first grade children with visual-perceptual retardation. *Education Horizons*, 1966-67, *45*, 60-63.

Cohen, S. R. *Organizing strategies and performance on short-term memory tasks.* Unpublished doctoral dissertation, 1970.

Cohen, T. B. Prediction of underachievement in kindergarten children. American Journal of Orthopsychiatry, 1963, 33, 330-331.

Cohn, Robert. Delayed acquisition of reading and writing abilities in children. Archives of Neurology, February, 1961, 4, 153-164.

_______. Neurological concepts pertaining to the brain-damaged child. In William T. Daley (Ed.), Speech and language therapy with the brain-damaged child. Washington, D. C.: Catholic University of America Press, 1962.

_______. The neurological study of children with learning disabilities. Exceptional Children, December, 1964, 31, 179-85.

_______. Arithmetic and learning disabilities. In H. Myklebust (Ed.), Progress in learning disabilities. II. New York: Grune and Stratton, 1971.

Cole, Michael. Three stages of paired associate learning in underachieving readers learning disability subjects and normal readers. Unpublished doctoral dissertation, 1971.

Coleman, H. M., Davison, S. T. Educational evaluation and visual-perceptual-motor dysfunction. Journal of Learning Disabilities, May, 1969, 2, 242-251.

Coleman, J. C. Perceptual retardation in reading disability cases. Percpetual and Motor Skills, 1959, 9, 117.

Coleman, J. C., and Rossoff, B. Intellectual factors in learning disorders. Perceptual and Motor Skills, 1963, 16, 139-52.

Coleman, J. M., Iscoe, I., and Brodsky, M. Draw-a-man test as a predictor of school readiness and as an index of emotional and physical maturity. Pediatrics, 1959, 24, 275-81.

Coleman, R. and Deutsch, C. Lateral dominance and right-left discrimination: a comparison of normal and retarded readers. Perceptual and Motor Skills, 1964, 19, 43-50.

Colligan, Robert C. Deficits in psychometric performance related to perinatal stress. Unpublished doctoral dissertation, 1970.

Collins, A. L., Atwood, G. R., and Moore, M. Stanford-Binet response patterns in epileptics. American Journal of Orthopsychiatry, 1938, 8, 51-63.

Committee on Education of Exceptional Children. Education of exceptional children. Review of Educational Research, February 1969, 39, 1-1125.

Connaly, Christopher, G. The psychosocial adjustment of children with dyslexia. Unpublished doctoral dissertation, 1969.

Conners, C. K. and Barcai, A. Effect of dextroamphetamine on children. Archives of General Psychiatry, 1967, 17, 478-85.

Conners, C. K., and Eisenberg, L. The effects of methylphenidate on symptomatology and learning in disturbed children. American Journal of Psychiatry, 1963, 120, 458-64.

Conners, C. K. and Rothschild, G. H. Drugs and learning in children. In J. Helmuth (Ed.), Learning Disorders. III. Seattle: Special Child Publications, 1968. Pp. 193-223.

Connolly, Christopher. The psychosocial adjustment of children with dyslexia. Exceptional Children, October 1969, 36, 126-127.

_______. Social and emotional factors in learning disabilities. In H. Myklebust (Ed.), Progress in learning disabilities. II. New York: Grune and Stratton, 1971.

Conrad, R. Acoustic confusions in immediate memory. British Journal of Psychology, 1964, 55, 75-78.

Cooper, J. Eliminating letter and number reversal errors with modeling and reinforcement procedures. Unpublished doctoral dissertation, 1971.

Coopersmith, S. A method for determining types of self-esteem. Journal of Abnormal Psychology, 1959, 59, 87-94.

Costa, L. D. Visual reaction time of patients with cerebral disease as a function of length and constancy of preparatory interval. Perceptual and Motor Skills, 1962, 14, 391-397.

Costner, B. M. Causation and diagnosis of reading disability. Journal of Psychology, 1937, 2, 161-91.

Cott, Allan. Megavitamins: the orthomolecular approach to behavioral disorders and learning disabilities. Academic Therapy, Spring 1972, 7, 245-257.

Cotter, Katherine C. First grade failure: diagnosis, treatment, and prevention. Childhood Education, November 1967, 44, 172-76.

Council for Exceptional Children. Medical intervention and the problem of drugs. Paper presented at the annual International Convention of the CEC, April 1970.

_______. Exceptional children conference papers: teach-in strategies, methods and instructional materials. Arlington, Virginia: Council for Exceptional Children, 1971. (a)

_______. State legislation for children with learning disabilities. CEC State Federal Information Clearinghouse for Exceptional Children. Series on Government and Exceptional Children, I, 1971. (b)

Crandall, Vaughn J., Dewey, R., and Katrovsky, W. Parents attitudes and behaviors and grade school children's academic achievement. In P. Mussen, H. Conger, J. Janeway, and J. Kagan (Eds.), Readings in child development and personality. New York: Harper and Row, 1965.

Cratty, B. Perceptual-motor behavior and educational processes. Springfield:' Charles C. Thomas.

Craviato, J. DeSicardie, E. R., and Birch, H. G. Nurtition, growth and neurointegrative development: an experimental and ecologic study. Pediatrics, 1966, 38, 319.

Creager, R. O. and van Riper, C. The effect of methylphenidate on the verbal productivity of children with cerebral dysfunction. Journal of Speech and Hearing Disorders, 1967, 10, 623-28.

Crinella, F. M. and Dreger, R. M. Tentative identification of brain dysfunction syndromes in children through profile analysis. Journal of Consulting and Clinical Psychology, 1972, 2, 251-260.

Critchley, Macdonald. The parietal lobes. London: Arnold, 1953.

_______. Developmental dyslexia. Springfield: Charles C. Thomas, 1964.

_______. Isolation of the specific dyslexic. In A. H. Keeney and V. T. Keeney (Eds.), Dyslexia. St. Louis: C. V. Mosley, 1968. Pp. 17-20.

_______. The dyslexic child. Springfield: Charles C. Thomas, 1970.

Croma, Ward. The effect of "pre-organizing" reading material on two types of poor readers. Unpublished doctoral dissertation, 1968.

_______. The difference model: a new explanation for some reading difficulties. Journal of Educational Psychology, December 1970, 61, 471-83.

Cromwell, R. L. Theory and research in activity level. Training School Bulletin, 1963, 4, 134-141.

Cronbach, Lee J. and Glesser, G. Assessing similarity between profiles. Psychological Bulletin, 1953, 30, 456-473.

Crosby, R. M. N. and Liston, R. A. Reading and the dyslexic child. London: Souvenir Press, 1968.

Crowley, Harry L. and Ellis, Bessie. Cross validation of a method for selecting children requiring special services in reading. The Reading Teacher, January 1971, 24, 312-19.

Cruickshank, W. M. The brain-injured child in home, school, and community. Syracuse: Syracuse University Press, 1967.

Cruickshank, W. M., Bontzen, F. A., Ratzebury, F. H., and Tannhauser, M. T. A teaching method for brain-injured and hyperactive children. Syracuse: Syracuse University Press, 1961.

Custenborder, Katherine R. An investigation of the structure and mode of classification strategies of retarded and achieving readers. Unpublished doctoral dissertation, 1969.

Daley, W. T. Speech and language therapy with the brain-injured child. Washington: Catholic University Press, 1962.

Davids, A., Goldenberg, L., and Laufer, M. W. The relation of the Archimedes Spiral After Effect and the Trail Making Test to brain damage in children. *Journal of Consulting Psychology*, 1957, *21*, 429-439.

Davids, A., and Parenti, A. N. Time orientation and interpersonal relations of emotionally disturbed and normal children. *Journal of Abnormal and Social Psychology*, 1958, *57*, 299-305.

Davidson, H. P. A study of reversals in young children. *Journal of Genetic Psychology*, 1934, *45*, 452-65.

Davis, F. D. Fundamental factors of comprehensive reading. *Psychometrica*, 1944, *9*, 195-197.

————. (Ed.) *The literature of research in reading with emphasis on models.* New Brunswick, New Jersey: Graduate School of Education, Rutgers, 1971. (a)

————. Psychometric research on comprehension in reading. In F. Davis (Ed.), *The literature of research in reading with emphasis on models*. New Brunswick: Graduate School of Education, Rutgers, 1971. (b)

Davis, F. R., Jr. *Speed of reading and rate of recovery in certain physiological subsystems*. Unpublished doctoral dissertation. University of California at Berkeley, 1963.

deAnjuriaguerra, J., Antonini, P., Besson, A., and others. Problems posed by dyslexia. *Journal of Learning Disabilities*, 1968, *1*, 158.

Dean, C. D. Predicting first grade reading achievement. *Elementary School Journal*, 1939, 609-16.

Dearborn, N. F. and Anderson, I. H. Aniseikonia as related to disability in reading. *Journal of Experimental Psychology*, 1938, *23*, 559-577.

Dearborn, W. F. *The psychology of reading*. Columbia University Contributions to Philosophy, Psychology, and Education, 1906.

————. Ocular and manual dominance in dyslexia. Paper read before the American Psychological Association. Toronto, 1931.

Dearborn, W. F. and Leverett, H. M. Visual defects and reading. *Journal of Experimental Education*, 1945, *13*, 111-24.

Dearborn, W. F. and Comfort, F. D. Reading disabilities and their correction. *Elementary English Review*, 1935, *12*, 131.

Dechant, E. V. *Improving the teaching of reading*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1964.

deHirsch, Katrina. Gestalt psychology as applied to language disturbances. *Journal of Nervous Mental Disorders*, 1954, *120*, 257-261.

————. Tests designed to discover potential reading difficulties at the six-year-old level. *American Journal of Orthopsychiatry*, 1957, *27*, 566-576.

_______. Concepts related to normal reading processes and their application to reading pathology. Journal of Genetic Psychology, 1963, 102, 277-85. (a)

_______. Two categories of learning difficulty in adolescence. American Journal of Orthopsychiatry, 1963, 33, 87-91. (b)

_______. Early prediction of reading disability. In A. H. Keeney and V. Keeney (Eds.), Dyslexia. St. Louis: C. V. Mosby Co., 1968.

deHirsch, K., Jansky, J., and Langford, W. S. Predicting reading failure: a preliminary study. New York: Harper and Row, 1966.

_______. The prediction of reading, spelling, and writing disabilities in children: a preliminary study. New York: Columbia University, 1965.

Delacato, Carl. The treatment and prevention of reading problems. Springfield: Charles C. Thomas, 1959.

_______. The diagnosis and treatment of speech and reading problems. Springfield: Charles C. Thomas, 1963.

_______. Neurological organization and reading. Springfield: Charles C. Thomas, 1967.

DeLaguna, G. A. Speech: its function and development. Bloomington: Indiana University Press, 1927.

Delker, Laryl Lee. The role of heredity in reading disability. Glassboro, New Jersey: Graduate Division of Glassboro State College, 1971. (mimeo.)

Denhoff, Eric. Early recognition of cerebral dysfunction in pediatric practice. Clinical Pediatrics, 1966, 5, 363-368.

Denhoff, E., Hainsworth, P. K., and Siqueland, M. L. The measurement of psychoneurological factors contributing to learning efficiency. Journal of Learning Disabilities, 1968, 1, 636-44.

Denhoff, E., Hainsworth, P. K., and Hainsworth, M. Learning disabilities and early childhood education: an information-processing approach. In H. Myklebust (Ed.), Progress in learning disabilities. II. New York: Grune and Stratton, 1971.

Dentler, Robert A. Equality of educational opportunity: a special review. In J. Stone and F. Schneider (Eds.), Teaching in the Inner city: a book of readings. III of Commitment to teaching. New York: Thomas Y. Crowell Co., Inc., 1970. Pp. 202-213.

deRenzi, E. and Faglioni, P. The comparative efficiency of intelligence and vigilance tests in detecting hemispheric cerebral damage. Cortex, 1965, 1, 410-418.

Derkin, Gerald. Effects of defferent treatment procedures on reading ability and anxiety level in children with learning difficulties. Unpublished doctoral dissertation, 1968.

Deutsch, C. P. Auditory discrimination and learning: social factors. Merrill-Palmer Quarterly, 1964, 10, 277-96.

Deutsch, C. P. and Scheiner, F. Brain-damaged children: a modality-oriented exploration of performance. Washington, D. C.: Department of Health, Education, and Welfare, November, 1967. Pp. 251-52.

Deutsch, C. and Schumer, F. Brain-damaged children. New York: Bruner/Mazel Inc., 1970.

Deutsch, C. and Zawel, D. Comparison of visual and auditory-perceptual functions of brain-injured and normal children. Perceptual and Motor Skills, 1966, 22, 303-309.

Deutsch, M. The role of social class in language development and cognition. American Journal of Orthopsychiatry, 1965, 35, 78-88.

Deutsch, M. and others. The disadvantaged child: studies of the social environment and the learning process. New York: Basic Books, 1967.

Diaz, Angel. Effects of visual and auditory distraction on paired associate learning of brain-injured and nonbrain-injured children. Unpublished doctoral dissertation, 1971.

DiCarlo, L. M. Defferential diagnosis of congenital aphasia. Volta Review, 1960, 62, 361-364.

Dockrell, W. B. The use of Weschler Intelligence Scale for Children in the diagnosis, of retarded readers. Alberta Journal of Educational Research, 1960, 6, 98-91.

Doehring, D. Patterns of impairment in specific reading disability. Bloomington: Indiana University Press, 1968.

________. Auditory abilities of children with learning problems. Journal of Learning Disabilities, September 1969, 2, 467-75.

Doll, E. A. Behavioral syndromes of central nervous system impairment. In J. F. Magary and J. R. Eichorn (Eds.), The exceptional child. New York: Holt, Rinehart and Winston, 1961.

________. Mental deficiency vs. neurophrenia. American Journal of Mental Deficiencies, 1953, 57, 477-480.

Doll, E. A. and Richardson, S. O. Early identification and mitigation of learning problems. Symposium 1967. New Brunswick, New Jersey: Rutgers University, 1967.

The Doman-Delacato treatment of neurologically handicapped children. Archives of Physical Medicine and Rehabilitation, 1969, 49, 193-86.

Doman, R. J., Spitz, E. B., Zucman, E., Delacato, C. H., and Doman, G. Children with severe brain injuries: neurological organization in terms of mobility. Journal of the American Medical Association, 1960, 174, 257-262.

Doost, R., and Turvey, M. T. Iconic memory and central processing capacity. *Perception and Psychophysics*, 1971, *9*, 269-274.

Downing, J. The perception of linguistic structures in learning to read. *British Journal of Educational Psychology*, 1969, *39*, 267-271.

________.Children's concept of language in learning to read. *Educational Research*, 1970, *12*, 106-112.

Downer, J. L. Interhemispheric integration in the visual system. In. V. B. Mountcastle (Ed.), *Interhemispheric relations and cerebral dominance*. Baltimore: Johns Hopkins Press, 1962.

Dozier, Paul. Specific reading disability--a survey. *Journal-Lancet*, May 1940, *60*, 202-204.

Drew, Arthur L. A neurological appraisal of familial congenital word-blindness. *Brain*, 1956, *79*, 440-460.

Drillen, L. M. A longitudinal study of the growth and development of prematurely and maturely born children: Part VII. Mental development, 2-5 years. *Archives of the Disabled Child*, 1961, *36*, 233-240.

Dunn, Lloyd M. A comparison of the reading processes of mentally retarded and normal boys of the same mental age. I. Studies of reading and arithmetic in mentally retarded boys. Monograph of the Society for Research. *Child Development*, 1954, *19*, 7-99.

________. *Peabody picture vocabulary test*. Minneapolis: American Guidance Service, 1959.

Dunn, L. M. and Smith, J. O. (Eds.) *Manual: Peabody language development kit, primary edition*. Nashville, Tennessee: Institute on Mental Retardation and Intellectual Development, George Peabody College for Teachers, 1964.

Durkin, Delores. Children who read before grade one. *The Reading Teacher*, 1961, *14*, 163-66.

________. *Children who read early*. New York: Teachers College Press, 1966.

Durrell, D. D. The influence of reading ability on intelligence measures. *Journal of Educational Psychology*, 1933, *24*, 412-416.

________. *The improvement of basic reading abilities*. Yonkers, New York: World Book, 1940.

________. *Analysis of reading difficulty*. New York: Harcourt, Brace, and World, 1945.

________. *Improving reading instruction*. New York: World Book, 1956.

________. First grade reading success study: a summary. *Journal of Education*, 1958, *140*, 1-48.

Durrell, D. D. and Hayes, M. T. Durrell listening-reading series. New York: Harcourt, Brace and World, 1969.

Dykman, R. A., Ackerman, P. T., Clements, S. D., and Peters, J. E. Specific learning disabilities: an attentional deficit syndrome. In H. Myklebust (Ed.), Progress in learning disabilities. II. New York: Grune and Stratton, 1971.

Dykstra, R. Auditory discrimination abilities and beginning reading achievement. Reading Research Quarterly, 1966, 1.1, 5-34.

_______. The use of reading readiness tests for diagnosis and prediction: a critique. In T. C. Barrett (Ed.), The evaluation of children's reading achievement. Newark: International Reading Association, 1967.

Eakin, Suzanne and Douglas, V. Automatization and oral reading problems in children. Journal of Learning Disabilities, January 1971, 4, 31-38.

Eames, T. H. A frequency study of physical handicaps in reading disability and unselected groups. Journal of Educational Research, 1935, 29, 1-5.

_______. Comparison of eye conditions among 100 reading failures, 500 ophthalmic patients and 150 unselected children. American Journal of Ophthalmology, 1948, 31, 713-17.

_______. The relationship of birth weight, the speeds of object and word perception, and visual acuity. Journal of Pediatrics, 1955, 47, 603-606.

_______. The effect of endocrine disorders on reading. Reading Teacher, April 1959, 12, 263-65.

Early, G. Perceptual training in curriculum. The Slow Learner Series. Columbus, Ohio: Charles Merrill.

Edwards, R. Phillip, Alley, G. R., and Snider, W. Academic achievement and minimal brain dysfunction. Journal of Learning Disabilities, 1971, 4, 134-38.

Eisenberg, L. The management of the hyperkinetic child. Developmental Medicine and Child Neurology, 1966, 8, 593-98. (a)

_______. Reading retardation, I: psychiatric and sociologic aspects. Pediatrics, 1966, 37, 352-65.

_______. The epidemiology of reading retardation and a program for preventive intervention. In J. Money (Ed.), The disabled reader. Baltimore: Johns Hopkins Press, 1966. Pp. 3-19. (c)

_______. Psychopharmacology in childhood: a critique. In E. Miller (Ed.), Foundation of child psychiatry. Oxford: Pergamon, 1968. Pp. 625-41.

Eisenberg, L., Gilbert, A., Cytryn, L., and Molling, P. A. The effectiveness of psychotherapy alone and in conjunction with perphenazine or placebo in the treatment of neurotic and hyperkinetic children. American Journal of Psychiatry, 1961, 117, 1088-93.

Eisenberg, L., Conners, C. K., and Sharpe, L. A controlled study of the differential application of out-patient psychiatric treatment for children. *Japanese Journal of Child Psychiatry*, 1965, *6*, 125-32.

Eisenson, J. Perceptual disturbances in children with central nervous system dysfunctions and implications for language development. *British Journal of Communications Disorders*, 1966, *1*, 21-32.

Ekwall, E. E. The use of WISC Subtest profiles in the diagnosis of reading difficulties. *Dissertation Abstracts*, 1966, *27*, 950-51.

Elkind, D. Reading, logic, and perception: an approach to reading instruction. In D. Elkind (Ed.), *Children and adolescents: interpretive essays on Jean Piaget*. New York: Oxford University Press, 1970.

Elkind, D. and Deblinger, J. Perceptual training and reading achievement in disadvantaged children. *Child Development*, 1969, *40*, 11-19.

Elkind, D., Koegler, P., and Go, Elsie. Studies in perceptual development: 11 part-whole perception. *Child Development*, 1964, *35*, 81-90.

Elkind, D., Larson, M., vanDorninck, W. Perceptual decentration learning and performance in slow and average readers. *Journal of Educational Psychology*, 1965, *56*, 50-56.

Emando, R. *The effectiveness of emphasizing reading skills.* An English course for underachievers. 1966.

Engleman, S. *Basic concept inventory*. Chicago: Follett Publishing Co., 1967.

Entwisle, D. R. Implications of language socialization for reading models and for learning to read. *Reading Research Quarterly*, Fall 1971, *7*, 111-167.

Ernhart, C. A., Graham, F. K., and Thurston, D. L. The relationship of perinatal anoxia to intelligence and to neurological deviations in the preschool child. *American Psychologist*, 1958, *13*, 324.

Ernhart, C. A., Graham, F. K., Eichman, P. L., Marshall, J. M., and Thurston, D. Brain-injury in the preschool: some developmental considerations: II. Comparison of the brain-injured and normal children. *Psychological Monographs*, *77*, No. 11, 1963.

Ervin, S., and Miller, W. Language development. *Child psychology: 62nd yearbook of the National Society for Study of Education*. Chicago: University of Chicago Press, 1963.

Eustis, R. S. The primary etiology of the specific language disabilities. *Journal of Pediatrics*, 1947, *31*, 448-455.

Evanston, Illinois Public Health Service. *Minimal brain damage in children.* Final Report. Washington, D. C.: Health Services and Mental Health Administration, June 1969.

Eveloff, H. H. Psychopharmachologic agents in child psychiatry. Archives of General Psychiatry, 1966, 14, 472-81.

Examining for aphasia. Second Edition. Psychological Corporation.

Fabian, Abraham A. Clinical and experimental studies of school children who are retarded in reading. Quarterly Journal of Child Behavior, 1951, 3, 15-37.

_______. Reading disability: an index of pathology. American Journal of Orthopsychiatry, 1955, 25, 319-29.

Farnham-Dissory, Sylvia. Symbol and synthesis in experimental reading. Child Development, 1967, 38, 221-231.

Farr, R. Reading: what can be measured? Newark, Delaware: International Reading Association Research Fund, 1969.

Farrell, M. Understanding of time relations of five, six, and seven-year-olds of high intelligence quotient. Journal of Educational Research, 1953, 46, 587-594.

Farris, L. Visual defects as factors influencing achievement in reading. California Journal of Secondary Education, 1934, 10, 50-51.

Feigenbaum, E. Information processing and memory. In D. A. Norman (Ed.), Models of human memory. New York: Academic Press, 1970.

Feldman, B. Prediction of first grade reading achievement from selected structure of intellect factors. Unpublished doctoral dissertation, 1970.

Feldman, S. C. Visual perception skills of children and their relation to reading. Unpublished doctoral dissertation, Columbia University, 1961.

Fernald, Grace. Remedial techniques in basic school subjects. New York: McGraw-Hill Book Co., 1943.

Ferrier, A. An investigation of psycholinguistic factors associated with functional defects of articulation. Unpublished doctoral dissertation, 1963.

Feshback, S. and others. A training demonstration and research program for the remediation of learning disorders in culturally disadvantaged youth. Los Angeles: California University Department of Education, 1969.

Figurel, J. A. (Ed.) Reading goals for the disadvantaged. Newark: International Reading Association, 1970.

Fildes, L. A. Psychological inquiry into the nature of the condition known as congenital word blindness. Journal of Neurology, 1921, 286-307.

Filmer, H. T. and Kahn, H. S. Race, socio-economic level, housing and reading readiness. Reading Teacher, 1967, 21, 153-57.

Fish, B. Drug use in psychiatric disorders of children. American Journal of Psychiatry, 1968, 124, 31-36.

Fisher, G. H. Developmental features of behavior and perception. *British Journal of Educational Psychology*, 1965, *35*, 69-78.

Fisher, Shari Pecore. Some reasons for reading disability in disadvantaged fourth graders. Tucson, Arizona: University of Arizona. M. A. Thesis, 1970.

Flanary, W. A study of the possible use of the Weschsler-Bellevue scale in diagnosis of reading difficulties in adolescent youth. *Dissertation Abstracts*, 1953, *14*, 1045.

Flax, Nathan. Visual function in dyslexia. *American Journal of Optometry* and *Archives of American Academy of Optometry*, 1968, *45*, 574-87. (a)

_______. Visual function in learning disabilities. *Journal of Learning Disabilities*, 1968, *1*, 551-56. (b)

Fledderjohann, W. C. A study of some relationships of visual and auditory perception to reading comprehension. Unpublished doctoral dissertation, University of California, 1965.

Flescher, Irwin. Ocular-manual laterality and perception rotation of literal symbols. *Genetic Psychology Monographs*, 1962, *66*, 3-48.

Flower, Richard M. Auditory disorders and reading disorders. In R. Flower, H. Gofman, and L. Lawson (Eds.), *Reading disorders*. Philadelphia: F. A. Davis, 1965. Pp. 81-102. (a)

Flower, R. M., Gofman, H. F., and Lawson, L. I. (Eds.) *Reading disorders*. Philadelphia: F. A. Davis, 1965. (b)

Flynn, P. T. and Byrne, M. C. Relationship between reading and selected auditory abilities of third grade children. *Journal of Speech and Hearing Research*, 1970, *13*, 731-40.

Forer, R. K. Time understanding of normal achieving and educationally handicapped boys. Unpublished doctoral dissertation, 1971.

Forness, Steven R. Lateral dominance in retarded readers with signs of brain dysfunction. *Dissertation Abstracts*, 1968, *29*, 1779.

Forrest, Thomas. Neurological and medical factors discriminating between normal children and those with learning disabilities. *Bulletin of the Orton Society*, 1968, *18*, 48-55.

Forward, T. Factors relating to an increase in achievement of hyperkinetic children on combined program of motor-perceptual training and drug therapy. Unpublished doctoral dissertation, 1970.

Fox, Kathleen. The relationship between balancing and reading achievement in children. Unpublished doctoral dissertation, 1968.

Franks, D. Children in educable mentally retarded and learning disability classes. *Exceptional Children*, 1971, *37*, 537-38.

Fraser, M. S. and Wilks, J. The residual efeects of neonatal asphyxia. *Journal of Obstetrics and Gynacology of the British Empire*, 1959, *66*, 748-752.

Freed, H. *The chemistry and therapy of behavior disorders in children*. Springfield: Charles C. Thomas, 1962.

Freed, H., Abrams, J., and Peifer, C. Reading disability: a new therapeutic approach and its implications. *Journal of Clinical and Experimental Psychopathology* and *Quarterly Review of Psychiatry and Neurology*, 1959, *20*, 251-5

Freed, H. and Peifer, C. Some considerations of the use of chlorpromazine in a child psychiatry clinic. *Journal of Clinical and Experimental Psychopathology* and *Quarterly Review of Psychiatry and Neurology*, 1956, *17*, 164-69.

Freedman, A. M. Drug therapy in behavior disorders. *Pediatric Clinics of North America*, 1958, *5*, 573-84.

Freedman, A. M., Braine, M., Heimer, C. B., Kowlessar, M., O'Connor, W. J., Wortis, H., and Goodman, B. The influence of hyperbilirubinemia on the early development of the premature. *Psychiatric Research Reports*, 1960, No. 13, 108-123.

Freeman, R. D. Drug effects on learning in children: a selective review of the past thirty years. *Journal of Special Education*, 1966, *1*, 17-44.

Friebergs, Vaira and Douglas, V. Concept learning in hyperactive and normal children. *Journal of Abnormal Psychology*, 1969, *74*, 388-95.

Freud, S. *Beyond the pleasure principle*. New York: Liverwright, 1950.

Freund, J. *Survey and recordings on learning disabilities for township high school district No. 113*. Highland Park, Illinois: Township High School District, 1969.

Friedas, E. Number concepts. *The teacher of brain-injured children*. Syracuse: Syracuse University Press, 1966. P. 126.

Friedman, K. C. Time concepts of junior and senior high school pupils and adults. *School Review*, 1944, *52*, 233-238.

Frierson, E. and Barbel, W. B. *Educating children with learning disabilities*. New York: Appleton -Century-Crofts, 1967. P. 117.

Froehlick, E. Relationship between visual memory for designs and early reading achievement. Unpublished doctoral dissertation, 1971.

Frostig, Marianne. Visual perception in the brain injured child. *American Journal of Orthopsychiatry*, 1963, *33*, 665-671.

_______. *Administration and scoring manual: developmental test of visual perception*. Palo Alto: Consulting Psychologists Press, 1964.

_______. Testing as a basis for educational therapy. *Journal of Special Education*, 1967, *2*, 15-34.

________. Education for children with learning disabilities. In.H. Myklebust (Ed.), *Progress in learning disabilities*. *I*. New York: Grune and Stratton, 1968. Pp. 234-66.

Frostig, M. and Horne, D. *The Frostig program for the development of visual perception*. Chicago: Follett, 1964.

Frostig, M., LeFever, D., and Whittlesye, J. A developmental test of visual perception evaluation normal and neurologically handicapped children. *Perceptual and Motor Skills*, 1961, *12*, 383-394.

________. Disturbancies in visual perception. *Journal of Educational Research*, 1963, *57*, 160-62.

Frostig, M. and Maslow, P. Language training. *Journal of Learning Disabilities*, 1968, *1*, 20.

Fuller, G. B. and Laird, J. T. The Minnesota percepto-diagnostic test. *Journal of Clinical Psychology*, 1963, *19*, Supp. No. 16.

Fullwood, Harry L. Study of children selected by "The Frostig developmental test of visual perception." Unpublished doctoral dissertation, 1968.

Furey, C. and Outridge, M. Reading imporvement in grade II as a result of language development. *Australian Council for Education Research: Bulletin for Psychologists*, 1967, *6*, 5.

Gagne, R. *The conditions of learning*. New York: Holt, Rinehart and Winston, 1965.

Gainer, W. L. The ability of the Weschsler Intelligence Scale for Children subtests to discriminate between boys and girls of average intelligence. *California Journal of Education Research*, 1962, *8*, 13.

Gallagher, J. J. Children with developmental imbalances: a psychoeducational definition. In W. Cruickshank (Ed.), *The teacher of brain-injured children*. Syracuse, New York: Syracuse University Press, 1966. Pp. 23-43.

Gardner, G. and Sperry, B. Basic word ambivalence and learning disabilities in childhood and adolescence. *American Journal of Psychotherapy*, 1964, *18*. 377-92.

Garrett, E. R. *Speech and language therapy under an automated stimulus control system*. Washington, D. C.: Bureau of Education for the Handicapped, Office of Education (DHEW), 1968.

Gaskins, A. I. W. Characteristics that differentiate dyslexics from non-dyslexic poor readers. Unpublished doctoral dissertation, 1970.

Gates, A. I. The psychology of reading and spelling with specific reference to disability. *Teachers College Contributions to Education*, No. 129. New York: Columbia University Press, 1922.

________. A study of the role of visual perception, intelligence and certain associative processes in reading and spelling. *Journal of Educational Psychology*, 1926, *18*, 433-445.

Gates, A. I. and McGinitie, W. Gates-McGinitie reading readiness test. New York: Bureau of Publications, Columbia University, 1968.

Gates, A. I. and McKillop, A. S. Gates-McKillop reading diagnostic tests. New York: Bureau of Publications, Columbia University, 1968.

Gates, A. I. and Russell, D. H. Gates-Russell spelling diagnostic test. New York: Bureau of Publications, Columbia University, 1937.

Gerow, J. R., III. The semantic differential and concept discrimination. Unpublished doctoral dissertation, 196[illegible].

Gerstmann, J. Finger agnosia. Wien Klin. Wchnschr., 1924, 37, 1010-1023. Cited by J. Fisher and W. E. Cleveland in Body image and personality. Princeton, New Jersey: Van Nostrand, 1958. P. 7.

Geschwind, N. Neurological foundations of language. In H. Myklebust (Ed.), Progress in learning disabilities. I. New York: Grune and Stratton, 1968.

Gesell, A. The embryology of behavior. New York: Harper, 1945.

Gesell, A. and Amatruda, D. S. Developmental diagnosis. New York: Paul B. Hoeber Inc., 2nd Ed., 1954. Pp. 215-254.

Getman, G. N. How to develop your child's intelligence: a research publication. Luverne, Minnesota:: G. N. Getman, 1962.

_______. The visuomotor complex in the acquisition of learning skills. In J. Hellmuth (Ed.), Learning disorders. I. Seattle: Special Child Publications, 1965.

Getman, G. N. and Kane, E. R. The physiology of readiness. Minneapolis, Minnesota: G. N. Getman, 1964.

Geyer, J. J. Perceptual systems in reading: the prediction of a temporal eye-voice span constant. In H. K. Smith (Ed.), Perception and reading. Newark: International Reading Association, 1970. Pp. 44-53.

_______. Models of perceptual processes in reading. In H. Singer and R. B. Ruddell (Eds.), Theoretical models and processes of reading. Newark: International Reading Association, 1970. Pp. 47-94.

_______. Comprehensive and partial models related to the reading process. In F. Davis (Ed.), The literature of research in reading with emphasis on models. New Brunswick, New Jersey: Graduate School of Education, Rutgers, 1

Gibson, E. J. Learning to read. In H. Singer and R. B. Ruddell (Eds.), Theoretical models and process of reading. Newark, Delaware: International Reading Association, 1970. Pp. 315-354.

Gibson, E., Gibson, J., Pick, A., and Osser, H. A developmental study of the discrimination of letter-like forms. Journal of Comparative and Physiological Psychology, 1962, 55, 897-906.

Gibson, E. J., Pick, A., Osser, H., and Hammond, M. The role of grapheme-phoneme correspondence in the perception of words. American Journal of Psychology, 1962, 75, 554-570.

Gibson, J. J. The problem of temporal order in stimulation and perception. Journal of Psychology, 1966, 62, 141-49.

Giffin, Mary. The role of child psychiatry in learning disabilities. In H. Myklebust (Ed.), Progress in learning disabilities. I. New York: Grune and Stratton, 1968.

Gilbert, L. C. Functional motor efficiency of the eyes and its relation to reading. University of California Publications in E., Vol. 11, No. 3. Berkeley: University of California Press, 1953.

Gilkey, B. G. and Parr, F. W. An analysis of the reversal tendency of fifty selected elementary school pupils. Journal of Educational Psychology, 1944, 35, 284-92.

Gillingham, A., and Stillman, B. W. Remedial training for children with specific disability in reading, spelling and penmanship. New York: Sackett and Wilhelms Lithographing Corp., 1940.

Gillooly, W. B. The influence of writing-system characteristics on learning to read. In F. Davis (Ed.), The literature of research in reading with emphasis on models. New Brunswick, N. J.: Graduate School of Education, Rutgers, 1971.

Gilmore, J. V. Gilmore oral reading test. New York: Harcourt, Brace and World, 1951.

Giovino, R. The perceptual patterns of normal and retarded readers in grades four and eight. Unpublished doctoral dissertation, 1970.

Glass, G. and Robbins, M. P. A critique of experiments of the role of neurological organization in reading performance. Reading Research Quarterly, 1967, 3.1, 5-51.

Glatter, Andrew N. Significant variables of short-term tutoring. Unpublished doctoral dissertation, 1968.

Gleason, H. A. An introduction to descriptive linguistics. New York: Holt, Rinehart, and Winston.

Gloeckler, Theodore and others. Project evlauation: the educational diagnostic and planning center. Cheyenne, Wyoming: Educational Diagnostic and Planning Center, 1968.

Goetzinger, Dirks and Baer, P. E. Auditory discrimination and visual perception in good and poor readers. Annual of Otology, Phonology, and Larynology, 1960, 69.

Goins, J. T. Visual perception abilities and early reading progress. Chicago: University of Chicago Press, 1958.

Gold, L. *The implimentation of a regional learning disability center for the treatment of pupils who manifest the dyslexic syndrome*. Paper presented at International Reading Association Conference. Boston, 1968.

Goldberg, H. K. The ophthalmologist looks at the reading problem. *American Journal of Ophthalmology*, 1959, *47*.

_______. Vision, perception and related facts in dyslexia. In A. Keeney and V. Keeney (Eds.), *Dyslexia*. St. Louis: C. V. Mosby, 1968.

Golden, Nancy. Auditory and visual function in poor readers. *Journal of Learning Disabilities*, September 1969, *2*, 475-81.

Goldstein, K. *The organism*. New York: American Book Co., 1939.

_______. *Language and language disorders*. New York: Grune and Stratton, 1948.

Gooddy, W. Time and the nervous system: the brain as a clock. *Lancet*, 1958, *93*, 1139-1144.

Gooddy, W. and Reinhold, M. Congenital dyslexia and asymmetry of the cerebral function. *Brain*, 1961, *94*, 321-42.

Goodman, K. (Ed.) *The psycholinguistic nature of the reading process*. Detroit: Wayne State University Press, 1968.

_______. Analysis of oral reading miscues: applied psycholinguistics. *Reading Research Quarterly*, 1969, *4*, 9-30. (a)

_______. Dialect barriers to reading comprehension. In. J. Baratz and W. Shuy (Eds.), *Teaching black children to read*. Washington: Center for Applied Linguistics, 1969. (b)

_______. Reading: a psycholinguistic guessing game. In H. Singer and R. B. Ruddell (Eds.), *Theoretical models and processes of reading*. Newark, Delaware: International Reading Association, 1970.

Goolsby, Thomas M., Jr. Culturally deprived head start subjects' reading readiness after training in listening. *Journal of Learning Disabilities*, 1968, *1*, 7.

Gordon, Sol. *The brain-injured adolescent*. East Orange, New Jersey: New Jersey Association for Brain-Injured Children, March, 1966.

Gordon, Sol and Golub, Risa. *Recreation and socialization for the brain-injured child*. East Orange: New Jersey Association for Brain-Injured Children, 1966.

Gorelick, Molly C. The effectiveness of visual form training in a prereading program. *Journal of Educational Research*, 1965, *58*, 315-18.

Gothberg, L. C. The mentally defective child's understanding of time. *American Journal of Mental Deficiency*, 1944, *53*, 441-445.

Gottesman, Ruth L. Auditory discrimination ability in standard English speaking and Negro dialect speaking children. *Journal of Learning Disabilities*, 1972, *5*, 94-101.

Gough, H. G. The relationship of socioeconomic status to personality inventory and achievement test scores. *Journal of Educational Psychology*, 1946, *37*, 527-540.

Graber, Sidney W. A study of inter-sensory integration and related skills and their relationship to reading achievement. Unpublished doctoral dissertation, 1968.

Graham, E. E., Weschsler-Bellevue and WISC scattergrams of unsuccessful readers. *Journal of Consulting Psychology*, 1952, *16*, 268-71.

Graham, F. K. A longitudinal study of the effects of perinatal anoxia. *American Psychologist*, 1958, *13*, 334.

Graham, F. K. and Berman, P. W. Current status of behavior tests for brain damage in infants and preschool children. *American Journal of Orthopsychiatry*, 1961, *31*, 713-728.

Graham, F. K., Matarazzo, R., and Caldwell, B. Behavioral differences between normal and traumatized newborns. *Psychology Monographs*, 1956, *70*, 20-21.

Graham, F., Ernhart, C., Craft, M., and Berman, P. Brain-injury in the preschool child: some developmental considerations: performance of normal children. *Psychological Monographs*, 1963, *77*, 10 (Whole No. 573).

Graham, F., and others. Development three years after perinatal anoxia and other potentially damaging newborn experiences. *Psychology Monographs*, 1962, *76*, 522.

Grauband, P. The extent of academic retardation in a residential treatment center. *Journal of Educational Research*, 1964, *58*, 78-80.

Gray, B., *Language acquisition through programmed conditioning*. Monterey: Institute of Speech and Hearing. Unpublished.

Gray, S. W. *The psychologist in the schools*. New York: Holt, Rinehart and Winston, 1963.

Gray, W. S. *Gray oral reading tests*. Manual of directions for administering, scoring, and interpretation, revised. Indianapolis: Division of Bobbs-Merrill, 1967.

Green, M. B. Improving the meaning vocabulary of inner-city children. In A. J. Figurel (Ed.), *Reading goals for the disadvantaged*. Newark: International Reading Association, 1970.

Green, O. C. and Perlman, S. M. Endocrinology and disorders of learning. In H. Myklebust (Ed.), *Progress in learning disabilities*. *II*. New York: Grune and Stratton, 1971.

Greenbaum, J. V., and Lurie, L. A. Encephalitis and a causative factor in behavior disorders of children. *Journal of the American Medical Association*, 1948, *136*, 923-30.

Grewel, F. Acalculia. *Brain*, 1952, 75, 397-407.

Griffiths, A. N. Self-concept in remedial work with dyslexic children. *Academic Quarterly*, Winter 1970-71, *6*, 125-33.

Groff, C. A. Investigations of relationship between neurological dysfunction and reading achievement. Unpublished doctoral dissertation, 1968.

Grossnickle, F. E., Brueckner, L. J. and Reckzeh, J. *Discovering meanings in elementary school mathematics*. 5th edition. New York: Holt, Rinehart, and Winston, 1968.

Grotberg, E. Learning disabilities and remediation in disadvantaged child. *Review of Education Research*, December 1965, *35*, 413-425.

________. Neurological aspects of learning disabilities a case for the disadvantaged. *Journal of Learning Disabilities*, June 1970, *3*, 321-327.

Grover, E. and Todd, J. *Ohio program for neurologically handicapped children*. Columbus: Ohio State Department of Education, Division of Special Education, 1967.

Grunebaum, M., Hurwitz, I., Prentice, N., and Sperry, B. Fathers of sons with primary learning inhibitions. *American Journal of Orthopsychiatry*, 1962, *32*, 462-72.

Grzynkowica, W. A critical study of methods of teaching children with learning disabilities. Unpublished doctoral dissertation, 1970.

Guest, K. E. Relationships among the ITPA receptive and expressive language tasks, intelligence, and achievement. Unpublished doctoral dissertation, 1971.

Guiliani, G. A. A relationship of self-concept and verbal-mental ability to levels of reading readiness amongst kindergarten children. Unpublished doctoral dissertation, 1968.

Gunderson, D. V. Reading problems: glossary of terms. *Reading Research Quarterly*, 1969, *4*, 538.

Guttman, E. Congenital arithmetic disability and acalculia. *British Journal of Medical Psychology*, 1936, 16, 16-35.

Hagen, J. W. The effect of distraction of selective attention. *Child Development*, 1967, *38*, 685-694.

Haines, M. S. Test performance of preschool children with and without organic brain pathology. *Journal of Consulting Psychology*, 1954, *18*, 37.

Hainsworth, P. and Siqueland, M. *Early identification of children with learning disabilities: the Meeting Street school screening test*. Providence: Crippled Children and Adults of Rhode Island, 1969.

Hakanson, E. E. The relationship between selected visual and auditory perception capacities and spelling capability as measured by tests requiring spelling recognition and spelling recall. Unpublished dissertation, University of Minnesota, 1966.

Halgren, M. R. Opus in see sharp. Education, 1961, 31, 369-371.

Hall, V. Does entrance age affect achievement? Elementary School Journal, 1963, 63, 391-96.

Hallahan, D. P. Cognitive styles--preschool implications for the disadvantaged. Journal of Learning Disabilities, January 1970, 3.

Hallgren, B. Specific dyslexia ('congenital word blindness') a clinical and genetic study. Acta Psychiatrica et Neurologica, 1950, 65, 1-279.

Halliwell, J. W. and Stein, B. W. A comparison of the achievement of early and late school starters in reading related and non-reading related areas in fourth and fifth grades. Elementary English, 1964, 41, 631-39.

Halpern, J. and Halpern, T. Four perspectives on anti-achievement. Psychoanalytic Review, 1966, 53, 407-17.

Halpin, V. Rotation errors made by brain-injured and familial children on two visual motor tests. American Journal of Mental Deficiencies, 1955, 59, 485-489.

Halstead, W. C. Brain and intelligence. Chicago: University of Chicago Press, 1947.

Halstead-Wepman aphasia screening test. Journal of Speech and Hearing Disorders, 1949, 14, 9.

Hamblin, R. and Ruckholdt, D. Structured exchanges and childhood learning: hyperagressive children. St. Ann, Missouri: Central Midwestern Regional Educational Laboratories, Inc., 1967.

Hampleman, R. S. A study of the comparative reading achievements of early and late school starters. Elementary English, 1959, 36, 331-34.

Hansen, D. N. Information-processing models for reading-skill acquisition. In F. Davis (Ed.), The literature of research in reading with emphasis on models. New Brunswick: Gruduate School of Education, Rutgers, 1971.

Hansen, D. and Rodgers, T. An exploration of psycholinguistic units in initial reading. Report No. 74. Stanford University: Instutute for Mathematical Studies in the Social Sciences, 1965.

Hansen, E. Recent studies of dyslexia. Developmental Medicine and Child Neurology, 1965, 7, 574-75.

Hansen, E. and Robinson, H. Reading readiness and achievement of primary grade children of different socio-economic status. Reading Teacher, 1967, 21, 52-56.

Hansen, P. A. Children called educationally-handicapped. California State Federation Journal, 1970, 20, 5-8.

Hanvik, L. and Hanson, H. The child with possible organic brain injury. Minneapolis: Washburn Memorial Clinic, 1964.

Hanvik, L. J., Nelson, S. E., Hanson, H. B., Anderson, A. S., Dressler, W. H., and Zarling, V. R. Diagnosis of cerebral dysfunction in children as made in a child guidance clinic. *American Journal of Disabled Children*, 1961, *101*, 364-375.

Hardy, W. G. On language disorders in young children: a reorganization of thinking. *Journal of Speech and Hearing Disorders*, 1965, *30*, 3-16.

Haring, N. and Hauck, Mary Ann. Improved learning conditions in the establishment of reading skills with disabled readers. *Exceptional Children*, 1969, 341-52.

Haring, N. and Miller, C. (Eds.) *Minimal brain dysfunction in children*. Public Health Service Publication No. 2015, Washington, D. C.: U. S. Government Printing Office, 1969.

Haring, N. and Ridgway, R. E. Early identification of children with learning disabilities. *Exceptional Children*, 1967, *33*, 387-95.

Haring, N. and Stavles, J. M. The effect of gross motor development of visual perception and hand-eye coordination. *Journal of the American Physical Therapy Association*, 1966, *46*, 129-35.

Harmeling, J. and Jones, M. Birth weights of high-school dropouts. *American Journal of Orthopsychiatry*, 1968, *38*, 63-66.

Harrington, Sister Mary James and Durrell, D. Mental maturity vs. perceptual abilities in primary reading. *Journal of Educational Psychology*, 1955, *46*, 375-80.

Harris, A. J. Lateral dominance, directional confusion and reading disability. *Journal of Psychology*, 1957, *44*, 283-94.

________. *How to increase reading ability*. 4th edition. New York: Longman's Green, 1961.

________. Diagnosis and remedial instruction in reading. *Innovation and change in reading instruction*, 67th yearbook of the National Society for the Study of Education, part 2. Chicago: University of Chicago Press, 1968.

________. *Perceptual difficulites in reading disabilities*. Pre-conference instructions. International Reading Association.

________. Report of the Interdisciplinary Committee on reading problems--in press.

Harris, A. J. and Roswell, F. G. Clinical diagnosis of reading disability. *Journal of Psychology*, 1953, *44*, 323-40.

Harris, P. L. Experimental comparison of two methods of tutoring: programmed vs. directed. Unpublished doctoral dissertation, 1967.

Harrison, M. L. The nature and development of concepts of time among young children. *The Elementary School Journal*, 1934, 508-514.

Harrower-Erickson, M. R. Personality changes accompanying organic brain lesions: III. A study of pre-adolescent children. *Journal of Genetic Psychology*, 1941, *58*, 391-405.

Harper, P. A., Fischer, L. K., and Rider, R. V. Neurological and intellectual status of prematures at three to five years of age. Journal of Pediatrics, 1959, 55, 679-690.

Harth, R. The effect of pupil preference for instructional procedures and diagnositc information upon word recognition ability. Unpublished doctoral dissertation, 1970.

Hartman, R. Investigation of incremental validity of human figure drawings on diagnosis of learning disabilities. Unpublished doctoral dissertation, 1971.

Hatton, D. A. The child with minimal cerebral dysfunction. Developmental Medicine and Child Neurology, 1966, 801, 71-78.

Hay, L. and Cothen, S. Perspectives for a classroom of disturbed children. Exceptional Children, 1967, 33, 577, 580.

Hayes, M. E. Prescriptive teaching as a supplement to behavior modification in the remediation of learning disorders. Unpublished doctoral dissertation, 1968.

Haywood, H. D. (Ed.) Brain damage in school age children. Washington, D. C.: The Council for Exceptional Children, 1968.

Head, H. Aphasia and kindred disorders of speech. 3 vols. London: Cambridge University Press, 1926.

Hebb, D. O. A textbook of psychology. Philadelphia: W. B. Saunders, 1958.

Heckelman, R. G. Auditory scramble. Academic Therapy Quarterly, 1967, 2, 94-96.

________. A neurological impress method of remedial reading instruction. Academic Therapy Quarterly, Summer 1969, 4, 277-88.

Hegge, Thorlief, Kirk, S. A., and Kirk, W. D. Remedial reading drills with directions. Ann Arbor, Michigan: George Wahr Publishing Co., 1940.

Helmuth, J. (Ed.) Disadvantaged Children. 3 vols. Seattle, Washington: Special Child Publications, 1967-1968.

Helper, M. M., Wilcott, R. C. and Garfield, S. L. Effects of chlorpromazine on learning and related processes in emotionally disturbed children. Journal of Consulting Psychology, 1963, 27, 1-9.

Henig, M. S. Predictive value of a reading readiness test and of teachers' forecasts. Elementary School Journal, 1949, 50, 41-46.

Hepburn, A. W. The performance of normal children of differing reading ability on the ITPA. Unpublished doctoral dissertation, 1968.

Hermann, K. Reading disability: a medical study of word-blindness and related handicaps. Springfield, Illinois: Charles C. Thomas, 1959.

Herrnstein, R. J. I. Q. The Atlantic, 1971, 228, 43-64.

Hewitt, F. M. A hierarchy of educational tasks for children with learning disorders. Exceptional Children, 1964, 31, 207-14.

________. Educational engineering with emotionally disturbed children. Exceptional Children, 1967, 33, 459-67.

________. The Santa Monica project. Santa Monica: Santa Monica Unified School District, 1969.

Hibbert, F. G. Dyslexia. Journal of Neurology, Neurosurgery and Psychology, 1961, 24, 93-94.

Hildreth, G. The success of young children in number and letter construction. Child Development, 1932, 3, 1-14.

________. Manual dominance in nursery school children. Journal of Genetic Psychology, 1948, 72, 29-45.

Hildreth, G., Griffiths, N., and McGauuran, M. Metropolitan readiness tests. New York: Harcourt, Brace and Workd, 1955.

Himes, J. E. An investigation of the haptic abilities of minimally brain injured and normal children. Unpublished doctoral dissertation, 1971.

Hinds, L. R. Evaluation of words in color or morphologic-algebraic approach to teaching reading to functionally illiterate adults. Unpublished doctoral dissertation, 1967.

Hinshelwood, J. Congenital word-blindness. London: H. K. Lewis, 1917.

Hinton, G. C. and Knights, R. M. Children with learning problems: academic history, academic prediction and adjustment three years after assessment. Exceptional Children, 1971, 37, 513-19.

Hirshoren, A. A comparison of the predictive ability of the revised Stanford-Binet intelligence scale and the Illinois test of psycholinguistic abilities. Exceptional Children, 1969, 35, 517-521.

Hirst, L. S. The usefulness of a two-way analysis of WISC subtests in the diagnosis of remedial reading problems. Journal of Experimental Education, 1960, 29, 153-160.

Hirst, W. E. Identification in the kindergarten of factors that make for future success in reading. Final Report, Project No. OE-6-10-023, Contract No. 5-0553. Washington, D. C.: U. S. Department of Health, Education and Welfare, 1969.

________. Entrance age--a predictor variable for academic success? Reading Teacher, 1970, 23; 547-56.

Hoch, P. H. and Zubin, J. (eds.) Psychopathology of communication. New York: Grune and Stratton, 1958.

Hochberg, J. Attention in perception and reading. In F. A. Young and D. B. Lindsley (Eds.), Early experience and visual information processing in perceptual and reading disorders. Washington, D. C.: National Academy of Sciences, 1970.

Hodges, K. and others. Educational survey to determine reading disabilities. Paper presented at the Annual Convention of the International Reading Association, Boston, 1968.

Holland, A. Comment on language deficiency of disadvantaged children. Journal of Speech and Hearing Disorders, 1971, 36, 90-100.

Holroyd, J. and Wright, F. Neurological implications of WISC verbal performance discrepancies in a psychiatric setting. Journal of Consulting Psychology, 1965, 29, 206-212.

Holroyd, R. G. and Reiss, R. L. Central auditory disturbances in dyslexic school children. Journal of Special Education, 1968, 2, 209-15.

Honzik, M. P., Hutchings, J. J., and Burnip, S. R. Birth record assessments and test performance at 8 months. American Journal of Diseases of Children, 1965, 109, 416-426.

Hopkins, F. W., Jr. An experimental study of the effects of repetitive compressed speech on listening comprehension. Unpublished doctoral dissertation, 1970.

Horn, A. The uneven distribution of the effects of specific factors. Southern California Educational Monographs, No. 12, 1941.

Horn, T. D. (Ed.) Reading for the disadvantaged: problems for the linguistically different learners. New York: Harcourt, Brace and World, Inc., 1970.

Howes, D. Vocabulary size estimated from the distribution of word frequencies. In H. Myklebust (Ed.), Progress in learning disabilities. II. New York: Grune and Stratton, 1971.

Huebner, R. W. Interactions between patterns of individual differences in sensory modalities of students and methods of classroom instruction. Unpublished doctoral dissertation, 1970.

Huelsman, C. B. Some recent research on visual problems in reading. American Journal of Optometry Monograph, No. 240, 1959.

Hudson, J. S. and Turner, L. Instruction in auditory and visual discrimination as means of improving spelling. Elementary School Journal, 1949, 466-69.

Hughes, J. A review of electroencephalography in learning disabilities. In H. Myklebust (Ed.), Progress in learning disabilities. I. New York: Grune and Stratton, 1968.

_______. Electroencephalography and learning. In H. Myklebust (Ed.), Progress in learning disabilities. I. New York: Grune and Stratton, 1968.

_______. Electroencephalography and learning disabilities. In H. Myklebust (Ed.), Progress in learning disabilities. II. New York: Grune and Stratton, 1971.

Hunsaker, D. E. The effects of hypnosis on the reading remediation of seventh grade boys. Unpublished doctoral dissertation, 1970.

Hunt, J. M. The psychological basis for using preschool enrichment as an antidote for cultural deprivation. Merrill-Palmer Quarterly, 1964, 10, 209-48.

_______. Intelligence and experience. New York: Ronald Press, 1961.

Hurley, O. Perceptual integration and reading problems. Exceptional Children, 1968, 35, 207-217.

Hurst, W. E. and Portenier, L. G. The Weschsler Scale as a diagnostic tool for cases of reading disability. Journal of Colorado-Wyoming Academy of Science, 1951, 4, 71. (abstract)

Hyatt, G. L. S. Some psycholinguistic characteristics of first graders who have reading problems at the end of second grade. Unpublished doctoral dissertation, 1969.

Ikeda, Miyoski. Relationships between ITPA, reading performance and IQ of third grade children. Unpublished doctoral dissertation, 1971.

Ilg, F. L. and Ames. L. B. Developmental trends in writing behavior. Journal of Genetic Psychology, 1950, 76, 291-312.

_______. Developmental trends in arithmetic. Journal of Genetic Psychology, 1951, 79, 3-46.

_______. School readiness. New York: Harper and Row, 1965.

Ingram, T. T. S. A characteristic form of overactive behavior in brain damaged children. Journal of Mental Science, 1956, 102, 550-558.

_______. Pediatric aspects of specific developmental dysphasia, dyslexia, and dysgraphia. Cerebral Palsy Bulletin (Developmental Medicine and Child Neurology), 1960, 2, 254-77.

_______. Specific learning difficulties in childhood. Public Health, 1965, 79, 70-80.

_______. The early recognition of handicaps in childhood. Journal of Learning Disabilities, 1969, 2, 5.

Jackson, J. H. The selected writings. New York: Basic Books, 1958.

Jackson, R. Results of early identification and guidance of underachievers. LaCross, Wisconsin: Wisconsin State University, 1966.

Jacobs, J. N. An evaluation of the Frostig visual-perceptual training program. Education Leadership, 1968, 1, 332-40. (Research supplement)

Jacobson, R. A method for teaching inflectional forms. Teaching Exceptional Children, 1971, 3, 70-72.

Jakobovits, L. A. Semantic satiation and cognitive dynamics. *Journal of Special Education*, 1967, *2*, 35-44.

Jampolsky, G. G. Psychiatric considerations in reading disorders. In R. Flower, H. Gofman, and L. Lawson (Ed.), *Reading disorders.* Philadelphia: F. A. Davis, 1965.

Jansky, J. J. The contribution of certain kindergarten abilities to second grade reading and spelling achievement. Unpublished doctoral dissertation, Columbia University, 1970.

Jenson, A. R. Intelligence, learning ability, and socio-economic status. *Journal of Special Education*, 1968.

________. How much can we boost IQ and scholastic achievement? *Harvard Educational Review*, 1969, *39*, 1-123.

Jenson, A. and Rohwer, W. An experimental analysis in culturally disadvantaged children. Final Report. Contract Number OEO2404. Washington: Office of Economic Opportunity, 1970.

Jerison, H. J. Effects of noise on human performance. *Journal of Applied Psychology*, 1959, *43*, 96-101.

Johnson, E. M. A study of psychological findings of one hundred children recovering from purulent meningitis. *Journal of Clinical Psychology*, 1960, *16*, 55-58.

Johnson, D. and Myklebust, H. *Learning disabilities: educational principles and practices*. New York: Grune and Stratton, 1967.

Johnson, M. S. Factors related to disability in reading. *Journal of Experimental Education*, 1957, *26*, 1-26.

Johnson, R. E. The validity of the Clymer-Barrett prereading battery. *Reading Teacher*, 1969, *22*, 609-14.

Jordan, T. E. Longitudinal study of preschool development. *Exceptional Children*, 1971, *37*, 509-12.

Jorstad, D. Psycholinguistic learning disabilities. *Journal of Learning Disabilities*, 1971, *4*, 143-49.

Kagan, J. Dyslexia and its remediation. In E. O. Calkin (Ed.), *Reading Forum*. NINDS Monograph, No. LL, 1970.

________. Reflection--impulsivity and reading ability in primary grade children. *Child Development*, 1965, *36*, 609-28.

Kagan, J. and Lemkin, J. Form, color, and size in children's conceptual behavior. *Child Development*, 1961, *32*, 25-28.

Kahn, E. and Cohen, L. H. Organic driveness: a brain stem syndrome and an experience. *New England Journal of Medicine*, 1934, *210*, 748-756.

Kahn, J. P. The emotional concolulants of the brain-injured child. Journal of Learning Disabilities, 1969, 2, 644-651.

Kahn, P. Time orientation and reading achievement. Perceptual and Motor Skills, 1965, 21, 157-58.

Kaliski, L. Arithmetic and the brain-injured child. The Arithmetic Teacher, 1962, 9, 245-251.

Kallos, G. L., Grabow, J. M., and Guarino, A. The WISC profile of disabled readers. Personnel and Guidance Journal, 1961, 39, 476-78.

Kappelman, M. and others. A study of learning disorders among disadvantaged children. Journal of Learning Disabilities, 1969, 2, 262-68.

Karlin, R. The prediction of reading success and reading readiness tests. Elementary English, 1957, 37, 320-323.

Karnes, M. B. Helping young children develop language skills. Washington, D.C.: Council for Exceptional Children, 1968.

_______. Research and development program on preschool disadvantaged children. Washington, D. C.: U. S. Department of Health, Education and Welfare, 1969. Vol. I.

Kass, Corrine E. Some psychological correlates of severe reading disability (dyslexia). Selected Studies on the Illinois test of psycholinguistic abilities (Dorothy J. Sievers and others, contributors). Madison, Wisconsin: Xer-Lith Service, Photo Press, 1963.

_______. Psycholinguistic disabilities of children with reading problems. Exceptional Children, 1966, 32, 539.

_______. Introduction to learning disabilities. Seminars in Psychiatry, 1969, 1, 240-244. (a)

_______. Learning disabilities. Review of Educational Research, 1969, 39, 71-82. (b)

_______. Educational management of reading deficits. In J. Irwin and M. Marge (Eds.) Principles of childhood learning disabilities. New York: Appleton-Century-Crofts, 1972. (a)

_______. Educational management of writing deficits. In J. Irwin and M. Marge (Eds.), Principles of childhood learning disabilities. New York: Appleton-Century-Crofts, 1972. (b)

Kass, Corrine E. and Myklebust, H. R. Learning disability: an educational definition. Journal of Learning Disabilities, 1969, 2, 38-40.

Katz, P. and Deutsch, M. Relation of auditory-visual shifting on reading achievement. Perceptual and Motor Skills, 1963, 17, 327-332.

Kawi, A. A. and Pasamanick, B. Association of factors of pregnancy and reading disorders in childhood. Journal of American Medical Association, 1958, 166, 1420-23.

_______. Prenatal and paranatal factors in the development of childhood reading disorders. Monograph of Social Research Child Development, 1959, 24, 14.

Keeney, A. (Ed.) Dyslexia: diagnosis and treatment of reading disorders. St. Louis: C. V. Mosby, 1968.

Keith, M. T. Sustained primary program for bi-lingual children. In J. Figurel (Ed.) Reading goals for the disadvantaged. Newark: International Reading Association, 1970.

Kelloway, P., Crawley, J. W., and Kagawa, N. A specific electroencephalographic correlate of convulsive equivalent disorders in children. Journal of Pediatrics, 1959, 55, 582-592.

Kelly, T. L. and Karey, A. C. Tests and measurements in the social sciences. New York: Scribner, 1934.

Kendall, B. S. A note on the relation of retardation in reading on a memory for designs test. Journal of Educational Psychology, 1948, 29, 370-373.

Kennard, M. A. The characteristics of thought disturbances as related to electroencephalographic findings in children and adolescents. American Journal of Psychiatry, 1959, 115, 911-921.

Kenny, T. J. and Clemmens, R. Medical and psychological correlates in children with learning disabilities. Journal of Pediatrics, 1971, 78, 273-77.

Kennedy, K. A study of children's hearing as it relates to reading. Journal of Experimental Education, 1942, 10, 238-251.

Kent Intermediate School District. The area learning center. Grand Rapids, Michigan: Kent Intermediate School District, 1969.

Keogh, B. The Bender-Gestalt as a predictive and diagnostic test of reading performance. Unpublished doctoral dissertation, The Claremont Graduate School, 1963.

_______. The Bender-Gestalt with children: research implications. Journal of Special Education, 1969, 3, 15-22.

_______. Hyperactivity and learning disorders: review and speculation. Exceptional Children, 1971, 38, 101-108.

Keogh, B. and Smith, C. Visuo-motor ability for school prediction: a seven-year study. Perceptual and Motor Skills, 1967, 25, 101-10.

Kephart, N. C. The slow learner in the classroom. Columbus: Charles E. Merrill Co., 1960.

_______. Perceptual motor aspects of learning disabilities. Exceptional Children, 1964, 31, 201-206.

_______. Perception: the teacher of brain-injured children. Syracuse: Syracuse University Press, 1966.

Kephart, N. C. and Strauss, A. A. A clinical factor influencing variations in IQ. *American Journal of Orthopsychiatry*, 1940, *10*, 343-350.

Kerfoot, J. F. The relationship of selected auditory and visual reading readiness measures to first grade reading achievement and second grade reading and spelling. *Dissertation Abstracts*, 1965, *25*, 1947.

Kermorian, R. B. Teacher appraisal of first grade readiness. *Elementary English* 1962, *39*, 196-201.

Kershner, J. and Bauer, D. *Neuropsychological and perceptual-motor theories of treatment for children with educational inadequacies*. Harrisburg: Pennsylvania Department of Public Instruction, Bureau of Research, 1966.

Kimball, B. The sentence-completion technique in a study of scholastic underachievement. *Journal of Consulting Psychology*, 1952, *16*, 353-358.

Kingston, A. J. The relationship of first grade readiness to third and fourth grade achievement. *Journal of Educational Research*, 1962, *56*, 61-67.

_______. Disjunctive categories in ephemeral models. In F. Davis (Ed.), *The literature of research in reading with emphasis on models*. New Brunswick: Graduate School of Education, Rutgers, 1971.

Kingston, A. J. and Weaver, W. W. Modeling the effects of oral language upon reading language. In F. Davis (Ed.), *The literature of research in reading with emphasis on models*. New Brunswick: Graduate School of Education, Rutgers, 1971.

Kinsbourne, M and Warrington, E. K. Developmental factors in reading and writing backwardness. In J. Money (Ed.), *The disabled reader*. Blatimore: Johns Hopkins Press, 1966.

Kirk, S. A. *The diagnosis and remediation of psycholinguistic disabilities*. Urbana: Institute for Research on Exceptional Children, University of Illinois, 1966.

_______. *Special education for handicapped children*. First Annual Report of the National Advisory Committee on Handicapped Children. Washington, D. C.: Office Of Education (DHEW), January 31, 1968.

_______. *Educating exceptional children*. 2nd edition. Boston: Houghton-Mifflin, 1972.

Kirk, S. A. and Kirk, W. D. *Psycholinguistic learning disabilities: diagnosis and remediation*. Urbana: The University of Illinois Press, 1971.

Kirk, S. A. and McCarthy, J. J. The Illinois test of psycholinguistic abilities--an approach to differential diagnosis. *American Journal of Mental Deficiency*, 1961, *66*, 399-412.

Kirk, S., McCarthy, J. J., and Kirk, W. D. *Illinois test of psycholinguistic abilities: revised edition*. Urbana: University of Illinois Press, 1968.

Klebanoff, S. G., Singer, J. L., Wilensky, H. Psychological consequences of brain lesions and ablations. Psychology Bulletin, 1951, 51, 1-42.

Kleffner, F. R. Aphasia and other language deficiencies in children: research and teaching at Central Institute for the Deaf. In W. Daley (Ed.), Speech and language therapy with the brain-damaged child. Washington, D. C.: Catholic University of America Press, 1962.

Klein, I. and Marsh, H. R. Identification and remediation of perceptual handicaps in learning to read. Final report. Glen Cove, New York: Glen Cove School District, 1969.

Kling, M. Background and development of the literature search: targeted research and development program in reading. In F. Davis (Ed.), The literature of research in reading with emphasis on models. New Brunswick: Graduate School of Education, Rutgers, 1971. (a)

_______. Quest for synthesis. In F. Davis (Ed.), The literature of research in reading with emphasis on models. New Brunswick: Graduate School of Education, Rutgers, 1971. (b)

Kluever, R. Mental abilities and disorders of learning. In.H. Myklebust (Ed.), Progress in learning disabilities. II. New York: Grune and Stratton, 1971.

Knights, R. M. and Hinton, G. C. Minimal brain dysfunction: clinical and psychological test characteristics. Academic Therapy Quarterly, 1969, 4, 265-73.

Knights, R. M. and Watson, P. The use of computerized profiles in neuropsychological assessment. Journal of Learning Disabilities, 1968, 12, 6-19.

Knobloch, H. and Pasamanick, B. Seasonal variations in the births of the mentally deficient. American Journal of Public Health, 1958, 48, 1201-1208.

_______. The syndrome of minimal cerebral damage in infancy. Journal of the American Medical Association, 1959, 70, 1384-1387.

_______. The developmental behavioral approach to the neurologic examination in infancy. Child Development, 1960, 33, 181-198.

Knobloch, H., Pasamanick, B., Harper, P., and Rider, R. The effect of prematurity on health and growth. American Journal of Public Health, 1959, 49, 1164-73.

Knoebel, M. Psychopharmacology for the hyperkinetic child. Archives of General Psychiatry, 1962, 6, 198-202.

Knoebel, M., Wolman, B., and Mason, E. Hyperkinesis and organicity in children. Archives of General Psychiatry, 1959, 1, 310-321.

Knott, J. R. EEG and behavior. American Journal of Orthopsychiatry, 1960, 30, 292-298.

Koppitz, E. M. Diagnosing brain damage in young children with the Bender-Gestalt test. Journal of Consulting Psychology, 1962, 26, 541-547. (a)

_______. *The Bender-Gestalt with the human figure drawing test for young school children: a manual for use with the Koppitz scoring system*. Columbus: Ohio Department of Education, 1962. (b)

_______. *The Bender-Gestalt test for young children.* New York: Grune and Stratton, 1964.

_______. *Children with learning disabilities: a five year follow-up study*. New York: Grune and Stratton, 1971.

Koppitz, E., Mardis, V., and Stephens, T. A note of screening school beginners with the Bender-Gestalt test. *Journal of Educational Psychology*, 1961, *52*, 80-81.

Korstvedt, A. J., Tessman, E., Prentice, N., and Kuhlman, C. Casual thinking in learning disabilities in latency aged boys. *American Journal of Orthopsychiatry*, 1964, *34*, 367-68.

Kranstadt, A. Development of attribution of responsibility in normal children and children with primary learning inhibitions. Unpublished doctoral dissertation, 1968.

Krech, D. Cortical localization of function. In L. Postman (Ed.), *Psychology in the making: histories of selected research problems*. New York: Alfred Knopf, 1962.

Krippner, G. The boy who read at eighteen months. *Exceptional Children,* 1963, *30*, 105.

Krippner, S. Etiological factors in reading disability of academically talented in comparison to pupils of average or slow learning abilities. *Journal of Educational Research*, 1968, *61*, 275-279.

Krippner, S. and Herald, C. Reading disabilities among the academically talented. *Gifted Child Quarterly*, 1964, *8*, 12-20.

Kugel, R. B. and Parsons, M. H. *Children of deprivation: changing the course of familial retardation*. Children's Bureau Publication No. 44. Washington, D. C.: U. S. Department of Health, Education, and Welfare, 1967.

Kunzelman, H. P. (Ed.) *Precision teaching*. Seattle: Special Child Publications, 1970.

Kylloven, R. Behavior: disturbed or disturbing? *Journal of the National Education Association*, 1964, *53*, 50-52.

Labov, W. Social factors in learning standard English. In R. W. Shuy (Ed.), *Social dialects and language learning*. Champaign, Illinois: National Council of Teachers of English, 1964.

Lachmann, F. M. Perceptual motor development in children retarded in reading ability. *Journal of Consulting Psychology*, 1960, *24*, 427-31.

Ladd, E. M. Learning disabilities. *Reading Teacher*, 1971, *24*, 383.

Ladefoged, P., and Broadbent, D. Perception of sequence in auditory events. *Quarterly Journal of Experimental Psychology*, 1960, 162-170.

Lagerman, A. P. Psycholinguistic characteristics of children with reading disabilities and the effects of remediation on psycholinguistic development and reading achievement. Unpublished doctoral dissertation, 1970.

LaGrange Area Department of Special Education. *The LaGrange area department of special education handbook*. LaGrange, Illinois: LaGrange Area Department of Special Education, 1966.

Lambert, N. Predicting and evaluating the effectiveness of children in school. In E. M. Bower and W. Hollister (Eds.), *Behavioral science frontiers in education*. New York: Wiley, 1967.

Lambert, W. Psychological approaches to the study of language. Part I: On learning, thinking, and human abilities. *Modern Language Journal*, 1963, *47*, 51-62.

Lambeth, J. *What optometry and its related fields have to offer the reading teacher*. Duncan, Oklahoma: Optometric Extension Program, 1966.

Lamendella, J. T. Long-term memory, conceptual structure and a theory of generative semantics. Unpublished doctoral dissertation, 1970.

LaPray, M. and Ross, R. *Comparison of two procedures for teaching reading to primary children with visual perceptual difficulties*. San Diego State College: Office of Education, 1965.

________. Auditory and visual-perceptual training. In J. Figurel (Ed.) *Vistas in reading*. Newark, Delaware: International Reading Association, 1967.

Lashley, K. S. *Brain mechanisms and intelligence: a quantitative study of injuries to the brain*. New York: Dover Publications, 1963.

Laufer, M. W. Cerebral dysfunction and behavior disorders in adolescents. *American Journal of Orthopsychiatry*, 1962, *32*, 501-507.

Laufer, M. W., and Denhoff, E. Hyperkinetic behavior syndrome in children. *Journal of Pediatrics*, 1957, *50*, 463-474.

Laufer, M. W., Denhoff, E., and Solomons, G. Hyperkinetic impulse disorder in children's behavior problems. *Psychosomatic Medicine*, 1957, *19*, 38-49.

Lawson, L. J. Ophthalmological factors in learning disabilities. In.H. Myklebust (Ed.), *Progress in learning disabilities*. *I*. New York: Grune and Stratton, 1968.

Lawton, D. *Social class, language, and education*. New York: Schocken, 1968.

Lay, M. Z. The relationship of selected perceptual and cognitive variables to word recognition learning. Unpublished doctoral dissertation, 1968.

Lee, M. M., Clark, W. W., and Lee, D. M. Measuring reading readiness. *Elementary School Journal*, 1962, *34*, 656-666.

Lee, L. C. and Lay, M. Z. Visual retention as a predictor of first grade reading achievement. Paper presented at the biennial SRCD meeting, Minneapolis, Minnesota, 1964.

Lehtinen, L. Have you ever known a perceptually-handicapped child? Evanston Fund for Perceptually Handicapped Children, Inc., 1965.

Lenneberg, E. H. Understanding language without the ability to speak. Journal of Abnormal and Social Psychology, 1962, 65, 419-425.

_______. Biological perspectives of language. In E. H. Lenneberg (Ed.), New direction in the study of language. Cambridge, Massachusetts: M.I.T. Press, 1964.

_______. Biological foundation of language. New York: Wiley, 1967.

Lenton, D. Visual-motor capacities and ocular efficiency in reading. Perceptual and Motor Skills, 1962, 15, 407-432.

Lerner, J. W. Children with learning disabilities, theories, diagnosis, and teaching strategies. Boston: Houghton Mifflin Company, 1971.

LeShan, L. L. Time orientation and social class. Journal of Abnormal and Social Psychology, 1952, 47, 589-92.

Levy, J. R. Selected etiological factors in reading retardation among elementary school children. Unpublished doctoral dissertation, 1968.

LeWinn, E. B., Doman, G. J., Dleacato, C., Doman, R. J., SPitz, E. G., and Thomas, E. Neurological organization: the basis for learning. In J. Helmuth (Ed.), Learning Disorders. II. Seattle: Special Child Publications, 1966.

Lewis, E. Initial teaching alphabet for instruction of reading disability cases. Washington, D. C.: Office of Education (DHEW), 1964.

Lewis, J. The improvement of reading ability through a developmental program of visual perception. Journal of Learning Disabilities, 1968, 1, 652-53.

Lewis, R. The brain-injured child. Chicago: National Society for Crippled Children and Adults, 1963.

Lewis, R., Strauss, A. A., and Lehtinen, L. The other child. New York: Grune and Stratton, 1951.

Ley, J. The troubles of the development of language. Journal of Neurological Psychiatry, 1930, 30, 415-57.

Liddle, G. Overlap among desireable and undesireable characteristics in gifted children. Journal of Educational Psychology, 1958, 49, 219-228.

Liebman, O. B. The relationship of personal and social adjustment to academic achievement in the elementary school. Dissertation Abstracts, 1954, 14, 67.

Lieberman, M. Projective response of retarded and adequate readers to frustrating academic vs. non-academic situations. Unpublished dissertation, 1969.

Lillienfeld, A. M., Pasamanick, B., and Rogers, M. Relationship between pregnancy experience and the development of certain neuropsychiatric disorders in childhood. *American Journal of Public Health*, 1955, *45*, 637-643.

Lincoln-Oseretsky Motor Development Scale. Western Psychological Services, 1955.

Lindemann, E. R. and others. Evaluation of a pre-school screening program. *American Journal of Orthopsychiatry*, 1963, *33*, 376-77.

Lokerson, J. Investigation of visual perception and psycholinguistic process, comparative performance of first grade boys on ITPA and adaptation of the ITPA. Unpublished doctoral dissertation, 1971.

Los Angeles County Superintendent of Schools. *An exploratory study of children with neurological handicaps in school districts of Los Angeles county*. Los Angeles: Los Angeles County Schools, April, 1963.

Lovell, K. and Slater, A. The growth of the concept of time. *Journal of Child Psychology and Psychiatry*, 1960, *1*, 179-190.

Lovett, T. C. Assessment of children with learning disabilities. *Exceptional Children*, 1967, *34*, 233-39.

Lowee, E. L. Sentence completion responses of children with learning disorders. Unpublished doctoral dissertation, 1969.

Luria, A. R. *Higher cortical functions in man*. New York: Basic Books, 1966.

Lurie, L. A., and Levy, S. Personality and behavior disorders of children following pertussis. *Journal of the American Medical Association*, 1942, *120*, 890-894.

Lundberg, O., and Walinder, J. Anorexia nervosa and signs of brain damage. *International Journal of Neuropsychiatry*, 1967, *3*, 165-173.

Lyness, S. L. The relationship of auditory perception to primary grade reading abilities. Unpublished doctoral dissertation.

Lynn, R. Individual differences in introversion-extroversion, reactive inhibition and reading attainment. *Journal of Educational Psychology*, 1960, *51*, 318-21.

Mackworth, J. F. The relation between the visual image and the post-perceptual immediate memory. *Journal of Verbal Learning and Verbal Behavior*, 1963, *2*, 75-85.

________. Auditory short-term memory. *Canadian Journal of Psychology*, 1964, *18*, 292-303.

________. Perceptual coding as a factor in short-term memory. *Canadian Journal of Psychology*, 1966, *20*, 18-33.

________. Some models of the reading process: learners and skilled readers. In F. Davis (Ed.), *The literature of research in reading with emphasis on models*. New Brunswick: Graduate School of Education, Rutgers, 1971.

Mackworth, N. H. Seven Cognitive skills in reading. In F. Davis (Ed.), *The literature of research in reading with emphasis on models*. New Brunswick: Graduate School of Education, Rutgers, 1971.

Mackworth, N. H., Grandstaff, N. W., and Pribram, K. H. Prolonged orientation to pictorial novelty in severely speech-disordered children. *Neuropsychologia*, 1971.

Malehorn, H. A. Some effects of specific visual motor training on the perceptual development of kindergarten children. Unpublished doctoral dissertation, 1971.

Malmquist, E. *Factors related to reading disability in the first grade of the elementary school*. Stockholm: Almquist and Wiksell Printers and Publ., 1958.

Mannino, Anthony. An investigation of the effectiveness of a modified version of the Donrau-Delacato neuropsychological treatment in reading performances. Unpublished doctoral dissertation, 1968.

Marchbanks, G., and Levin, H. Cues by which children recognize words. *Journal of Educational Psychology*, 1965, *56*, 57-61.

Marie, Rose. Some reservations in the significance of dialect in the acquisition of reading. In J. Figurel (Ed.), *Reading goals for the disadvantaged.* Newark: International Reading Association, 1970.

Mark, H. J. Two symptoms pathognomonic for congenital cerebral communication disorders in children. *Journal of Pediatrics*, 1959, *55*, 391-396.

Mark, H. J. and Hardy, W. G. Orienting reflex disturbances in central auditory or language handicapped children. *Journal of Speech and Hearing Disorders*, 1958, *23*, 237-242.

Mark, H. J. and Pasamanick, B. Asynchronism and apparent movement thresholds in brain-injured children. *Journal of Consulting Psychology,* 1958, *22*, 173-77.

Masland, R. Brain mechanisms underlying the language function. *Bulletin of the Orton Society*, 1967, *17*, 1- 1.

________. Some neurological processes underlying language. Washington, D. C.: National Institute of Neurological Diseases and Blindness, 1968.

Maslow, P., Frostig, M., Lefever, D. S., and Whittlesey, J. R. B. The Marianne Frostig developmental test of visual perception, 1963 standardization. *Perceptual and Motor Skills*, 1964, *19*, 463-99.

Mattick, W. E. Predicting success in first grade. *Elementary School Journal*, 1963, *64*, 273-276.

May, M. Z. An experimental investigation of multimodel discrimination learning by aphasic children utilizing an automated apparatus. Unpublished doctoral dissertation, 1968.

McCarthy, Jeanne. How to teach the hard to reach. *Grade Teacher Magazine*, 1967, March/June.

McCarthy, Jeanne and Paraskeuopoulos, J. Behavior patterns of learning disabled, emotionally disturbed, and average children. *Exceptional Children*, 1969, *36*, 69-74.

McCarthy, J. J. and McCarthy, F. F. *Learning disabilities*. Boston: Allyn and Bacon, 1969.

McCormick, C. C., Poetker, B., Schnobrich, J., and Footlick, S. W. *Improvement in reading achievement through perceptual-motor training*. Chicago: Reading Research Foundation, 1967.

McCormick, C., Schnobrich, J., and Fottlick, W. The effect of perceptual-motor training on reading achievement. *Academic Therapy*, 1969, *4*, 17-76.

McCreary, E. Some positive characteristics of disadvantaged learners and their implications for education. In J. Stone and F. Schneider (Eds.), *Teaching in the inner city: a book of readings*. New York: Thomas Y. Crowell, 1970.

McDavid, Raven I., Jr. Dialectology and teaching of reading. In Joan C. Baratz and R. Shuy (Eds.), *Teaching black children to read*. Washington: Center for Applied Linguistics, 1969.

McDonald, A. S. Intellectual characteristics of disabled readers at the high school and college levels. *Journal of Developmental Reading*, 1964, *7*, 97-101.

McDonald, C. W. *Problems concerning the classification and education of children with learning disabilities*. George Peabody College for Teachers, 1967. (mim.)

McDonald, E. T. *Cerebral palsy, foundation of speech pathology series*. Prentice-Hall, Inc., 1964.

McDougal, R. Sex differences in the sense of time. *Science*, 1909, *19*, 707-8.

McGinnis, M. A. *Aphasic children: identification and education by the association method*. Washington, D. C.: Volta, 1963.

McGlannan, F. K. Familial characteristics of genetic dyslexia: preliminary report from a pilot study. *Journal of Learning Disabilities*, 1968, *1*, 185-91.

McGrady, H. J. Language pathology and learning disabilities. In H. Myklebust (Ed.), *Progress in learning disabilities*. I. New York: Grune and Stratton, 1968.

McIntyre, Patricia M. Dynamics and treatment of the passive-agressive underachiever. *American Journal of Psychotherapy*, 1964, *18*, 95-108.

McLean, T. K. A comparison of subtest performance of two groups of retarded readers with like groups of non-retarded readers on WISC. University of Oregon Dissertation.

McLeod, J. Prediction of childhood dyslexia. *The Slow Learning Child*, March 1966, *12*, 143-155.

_______. Some psycholinguistic correlates of reading disability in young children. *Reading Research Quarterly*, 1967, *2*, 5-31.

_______. Reading expectancy from disabled learners. *Journal of Learning Disabilities*, 1968, *1*, 97-105.

_______. *Dyslexia schedule manual*. Cambridge, Massachusetts: Educators Publishing Service, Inc., 1970.

Mecham, M. J. and others. *Communication training in children with brain damage*. Springfield: Charles C. Thomas, 1966.

Meier, J. H. Prevalence and characteristics of learning disabilities found in second grade children. *Journal of Learning Disabilities*, 1971, *4*, 1-16.

Meiselman, J. R. Variables related to identification of underachievers. Unpublished doctoral dissertation, 1970.

Melton, A. W. Implications of short-term memory for a general theory of memory. *Journal of Verbal Learning and Verbal Behavior*, 1963, *2*, 1-21.

Menyuk, P. *Sentences children use*. Cambridge: M. I. T. Press, 1969.

Metraux, R. Auditory memory span for speech sounds: norms for children. *Journal of Speech Disorders*, 1944, *9*, 31-38.

Michal-Smith, H. and Kastein, S. *The special child: diagnosis, treatment, habilitation*. Seattle: Bureau of Publications, New School for the Special Child, 1962.

Miele, J. A. *Sex differences in intelligences. The relationship of sex to intelligence as measured by the WAIS and WISC*. New York: New York University, 1958.

Miller, D. R. and Westman, J. C. Reading disabilities, 'hidden problems' and the stability of families. *American Journal of Orthopsychiatry*, 1963, *33*, 303-304.

Miller, G. A. The magical number seven, plus or minus two: some limits on our capacity of processing information. *Psychological Review*, 1956, *63*, 81-97.

Millichap, J. G. Drugs in management of hyperkinetic and perceptually handicapped children. *Journal of the American Medical Association*, 1968, *206*, 1527-30.

Millichap, J. and Boldrey, E. Studies in hyperkinetic behavior. *Neurology*, 1967, *17*, 467-471

Millikin, C. and Darley, W. (Eds.) *Brain mechanisms underlying speech and language*. New York: Grune and Stratton, 1967.

Mills, R. E. An evaluation of techniques for teaching word recognition. *Elementary School Journal*, 1956, 221-225.

Millstein, I. J. An empirical study of the Delacato theory and training procedures. Unpublished doctoral dissertation, 1968.

Minskoff, J. G. *The effectiveness of a special program based on language diagnosis in overcoming learning disabilities in mentally retarded and educationally disabled children*. New York: Yeshiva University, 1966.

Mira, M. P. Individual patterns of looking and listening preferences among learning disabled and normal children. *Exceptional Children*, 1969, *34*, 649-58.

Mitchell, B. C. Use of Metropolitan Reading Readiness Test as a predictor of first grade achievement. *Educational Psychology Measurement*, 1962, *22*, 765-72.

Money, J. (Ed.) *Reading disability: progress and research needs in dyslexia*. Baltimore: The Johns Hopkins Press, 1962.

_______. Two cytogenetics syndromes--psychological comparisons: I. Intelligence and specific factor quotients. *Journal of Psychiatric Research*, 1964, *2*, 223-231.

_______. (Ed.) *The disabled reader*. Baltimore: Johns Hopkins Press, 1966.

Money, J. and Lewis, V. Longitudinal study of intelligence quotient in treated congenital hypothyroidism. In M. Cameron and M. O'Connor (Eds.) *Brain-thyroid relationships*. CIBA Foundation, study group No. 18. Boston: Little-Brown, 1964.

Monroe, M. *Children who cannot read*. Chicago: University of Chicago Press, 1932.

_______. Reading aptitude tests for prediction and analysis of reading abilities and disabilities: primary form. *Education*, 1935, 56, 7-14.

Moroson, G. S. The effects of perceptual training on the reading achievement of third and fourth grade retarded readers. Unpublished doctoral dissertation, 1970.

Morse, W., Cutler, R., and Fink, A. *Public school classes for the emotionally handicapped: a research analysis*. Washington, D. C.: Council for Exceptional Children, a Department of the NEA, 1964.

Morris, C. J., Jr. Electroencephalographic and evoked potential correlates of reaction time and visual discrimination performance. Unpublished doctoral dissertation, 1968.

Morrison, Ida E. The relation of reading readiness to certain language factors. In J. Figurel (Ed.), *Challenge and experiment in reading*. New York: Scholastic Magazines, 1962.

Morris, M. P. Individual patterns of looking and listening preferences among learning disabled and normal children. Unpublished doctoral dissertation, 1968.

Mowrer, O. H. Hearing and speaking: an analysis of language learning. *Journal of Speech and Hearing Disorders*, 1948, *23*, 143-152.

_______. The psychologist looks at language. *American Psychologist*, 1954, *9*, 660-694.

_______. Learning theory and the symbolic processes. New York: Wiley, 1960.

Mountcastle, V. B. Interhemispheric relations and cerebral dominance. Baltimore: Johns Hopkins Press, 1962.

Moxley, Roy A. A program for reducing reversals of digits and symbols produced by kindergarten children. Unpublished doctoral dissertation, 1970.

Muehl, S. Relation between word-recognition errors and hand-eye preference in preschool children. Journal of Educational Psychology, 1963, 54, 316-21.

Muehl, S. and Kremenack, S. Ability to match information within and between auditory and visual sense modalities and subsequent reading achievement. Journal of Educational Psychology, 1966, 57, 230-239.

Mulligan, W. A study of dyslexia and delinquency. Academic Therapy Quarterly, Spring 1969, 4, 177-87.

Munz, A. The relationship between CNS functions and verbal communication. Unpublished doctoral dissertation, 1970.

Murphy, H. A., and Durrell, D. D. Murphy-Durrell reading readiness analysis. Tarrytown, New York: Harcourt, Brace and World, 1965.

Myers, P. T. and Hammill, D. D. Methods of learning disabilities. New York: John Wiley, 1969.

Myklebust, H. R. Aphasia in children. Exceptional Children, 1952, 19, 9-14.

_______. Auditory disorders in children: a manual for differential diagnosis. New York: Grune and Stratton, 1954.

_______. Learning disorders: psychoneurological disturbances in childhood. Rehabilitation Literature, 1964, 25, 354-360.

_______. The development and disorders of written language. New York: Grune and Stratton, 1965.

_______. Learning disabilities: definition and overview. In H. Myklebust (Ed.), Progress in learning disabilities. I. New York: Grune and Stratton, 1968. (a)

_______. Progress in learning disabilities. I. New York: Grune and Stratton, 1968. (b)

_______. Progress in learning disabilities. II. New York: Grune and Stratton, 1971.

Myklebust, H. R., Bannochie, M. N., and Killen, J. R. Learning disabilities and cognitive processes. In H. Muklebust (Ed.), Progress in learning disabilities. II. New York: Grune and Stratton, 1971.

Myklebust, H. R. and Boshes, B. Psychoneurological learning disorders in children. Archives of Pediatrics, 1960, 77, 247-56.

_______. Minimal brain damage in children. Final Report, Contract No. 108-65-142 Neurological and Sensory Disease Control Program. Washington, D. C.: Department of Health, Education, and Welfare, 1969.

Myklebust, H. R. and Johnson, D. Dyslexia in children. *Exceptional Children*, September, 1962, *29*, 14-25.

Myklebust, H. R., Johnson, D., and Gooddy, W. Psychoneurological learning disorders in children. *Archives of Pediatrics*, 1960, *77*, 247-256.

National Advisory Committee on Handicapped Children of the U. S. Office of Education, 1968.

Namnum, A. and Prelinger, E. On the psychology of the reading process. *American Journal of Orthopsychiatry*, 1961, *31*, 820-28.

Neely, J. H. A study of the relationship of figure-background difficulty and school achievement in cerebral palsied children. Dissertation. Ann Arbour: University Microfilms, Inc., 1958.

Neill, A. *Summerhill*. New York: Hart Publishing, 1960.

Neisser, U. *Cognitive psychology*. New York: Appleton-Century-Crofts, 1967.

Nelson, C. D. Subtle brain damage: its influence on learning and language. *Elementary School Journal*, 1961, *61*, 317-324.

Neville, D. A comparison of the WISC patterns of male retarded and non-retarded readers. *Journal of Educational Research*, 1961, *54*, 195-197.

_______. Peabody inventory rating scale on emotional disturbance. Nashville, 1965. (a)

_______. The relationship between reading skills and intelligence test scores. *Reading Teacher*, 1965, *18*, 257-262. (b)

Neville, D. and Bruininks, R. Reading and intelligence. In H. C. Haywood (Ed.), *Psychometric intelligence*. New York: Appleton-Century-Crofts, in press.

Newbrough, J. R. and Kelly, J. G. A study of reading achievement in a population of school children. In J. Money (Ed.), *Reading disability*. Baltimore: Johns Hopkins Press, 1962.

Newland, T. E. Psycho-social aspects of the adjustment of the brain injured. *Exceptional Children*, 1957, *23*, 149-153.

Newman, D. The effects of perceptual training, age, and intelligence on the reading achievement of special class children enrolled in learning disability classes. Unpublished doctoral dissertation, 1970.

Nichols, J. V. V. Children with reading difficulties. *American Journal of Ophthalmology*, 1965, *60*, 935-37.

Nielson, J. M. Gerstmann syndrome: finger agnosia, agraphia, confusion of right and left and acalculia. *Archives of Neurology and Psychiatry*, 1938, *39*, 536-560.

_______. *Agnosia, apraxia, aphasia*. 2nd edition. New York: Paul Hoeber, 1946.

Norman, D. H. (Ed.) Models of human memory. New York: Academic Press, 1970.

Norris, A. S. Prenatal factors in intellectual and emotional development. Journal of the American Medical Association, 1960, 172, 413-417.

Northwestern University and U. S. Office of Education. Proceedings of the Conference on Learning Disabilities and Interrelated Handicaps. Evanston, Illinois: Northwestern University, 1967. (mimeo.)

Oakland, T. Auditory discrimination and socioeconomics statutes as correlates of reading ability. Journal of Learning Disabilities, 1969, 2, 325-329.

Oas, D. A. Immediate memory and intellectual functioning in a brain-damaged population. Unpublished doctoral dissertation, 1968.

O'Donnel, P. Delacato training for reading achievement and visual motor integration. Journal of Learning Disabilities, 1969, 2, 441-47.

Oettinger, L. The use of deanol in the treatment of disorders of behavior in children. Journal of Pediatrics, 1958, 53, 671-75.

Oettinger, L., Jr., Nikonishi, H., and Gill, G. Cerebral dysrhythmia induced by reading (subclinical reading epilepsy). Developmental Medicine and Child Neurology, 1967, 9, 191-201.

O'Grady, D. Psycholinguistic abilities in primary school age children with learning disabilities. Unpublished doctoral dissertation, 1968.

Oldman, K. R. Learning disabilities and reading: the teaching of reading to learning disabled children through linguistically oriented materials using gestalt theory and typewriter, etc. Unpublished doctoral dissertation, 1971.

Oliphant, G. C. A study of factors involved in early identification of specific language disability (dyslexia). Unpublished doctoral dissertation, 1970.

Olson, A. V. School achievement, reading ability and specific visual perception skills in the third grade. Reading Teacher, 1966, 19, 490-93.

Omer, A. G. Equipping the mind for learning: a curricular plan involving knowledge about knowledge. Unpublished doctoral dissertation, 1968.

Ong, B. H. The pediatrician's role in learning disabilities. In H. Myklebust (Ed.), Progress in learning disabilities. I. New York: Grune and Stratton, 1968.

Orton, S. T. Specific reading disability--strephosymbolia. Journal of the American Medical Association, April 7, 1928, 90, 1095-99.

_______. Localization of function in the cerebral cortex. Baltimore: Williams and Wilkins, 1934.

_______. Reading, writing, and speech problems in children. New York: W. W. Norton and Co., 1937.

_______. Word-blindness in school children and other papers of strephosymbolia. J. L. Orton (Ed.). Pomfret, Connecticut: The Orton Society, Inc., 1966.

Orton Society. Dyslexia in special education. Papers presented in the section on Special Language Disability at the Forty-Second Annual Convention of the Council for Exceptional Children. Monograph Vol. I. Pomfret: The Orton Society, 1964.

Osgood, C. E. and Miron, M. S. (Eds.) Approaches to the study of aphasia: a report of an interdisciplinary conference on aphasia. Urbana, Illinois: University of Illinois Press, 1963.

Otto, W. The acquisition and retention of paired associates by good, average, and poor readers. Journal of Educational Psychology, 1961, 52, 241-248.

_______. Ability of poor readers to discriminate paired associates under differing conditions of confirmation. Journal of Educational Research, 1963, 56, 428-431.

Otto, W. and Fredricks, R. C. Relationship of reactive inhibition to reading skill attainment. Journal of Educational Psychology, 1963, 54, 4, 227-30.

Otto, W., Koenke, K. and Cooper, C. Good and poor readers' learning of verbal and pritoral paired-associate tasks. Psychonomic Science, 1968, 11, 347-8.

Owen, F. W. Learning disability--a familial study. Bulletin of the Orton Society, 1968, 18, 33-39.

Owen, F. W. and Compton, C. L. The learning centers in Palo Alto. Journal of Learning Disabilities, 1968, 1, 664-671.

Ozehosky, R. J. children's self-concept and kindergarten achievement. Unpublished doctoral dissertation, 1967.

Ozer, M The neurological evaluation of school age children. Journal of Learning Disabilities, 1968, 1, 84-88.

Paine, R. S. and Oppe, T. E. Neurological examination of children. Chs. V, VI, and VII. Clinics in Developmental Medicine, Double Volume 20/21. London: Spastics Society and William Heinemann, Ltd., 1966.

Paivio, A. Mental imagery in associative learning and memory. Psychological Review, 1969, 76, 241-263.

Paraskevopoulos, J. N. and Kirk, S. A. The development and psychometric characteristics of the revised ITPA. Chicago: University of Illinois Press, 1969.

Parks, G. E. Nurture and/or nature caused reading difficulties? Archives of Pediatrics, 1952, 69, 432-44.

_______. Reading difficulties from the ophthalmic point of view. American Journal of Ophthalmology, 1948, 31, 28-34.

Park, G. E. and Burri, C. J. The effect of eye abnormalities on reading difficulties. Journal of Educational Psychology, 1943, 420-30.

Parkinson, R. Short-term memory while shadowing: multiple-item recall of visually and of aurally presented letters. *Journal of Experimental Psychology*, 1972, *95*, 256-265.

Pasamanick, B. and Knobloch, H. Brain damage and reproductive casuality. *American Journal of Orthopsychiatry*, 1960, *30*, 299-305.

_______. Epidemiologic studies on the complications of pregnancy and the birth process. In G. Caplan (Ed.), *Prevention of mental disorders in children*. New York: Basic Books, 1961, 74-94.

_______. Prediction from assessment of neuromotor and intellectual status in infancy. In J. Zubin and G. A. Jervis (Eds.), *Psychopathology of Mental Development*. New York: Grune and Stratton, 1967.

Pasamanick, B. and others. Pregnancy experience and the development of behavior disorder in children. *American Journal of Psychiatry*, 1956, *112*, 613-17.

Pascal, G. R. and Suttell, B. J. *The Bender-Gestalt*. New York: Grune and Stratton, 1951.

Patterson, G. R., Jones, J. W., Whittier, J., and Wright, M. A. A behavior modification technique for the hyperactive child. *Behavior Research and Therapy*, 1965, *2*, 217-26.

Patterson, G. R., McNeal, S., Hawkins, N., and Phelps, R. Reprogramming the social environment. *Journal of Child Psychology and Psychiatry*, 1967, *8*, 181-95.

Pearson, G. H. J. A survey of learning difficulties in children. *Psychoanalytic Study of the Child*, 1952, *7*, 322-78.

Penfield, W. and Roberts, L. Speech and brain mechanisms. Princeton: Princeton University Press, 1959.

Penn, J. A. Reading disability: a neurological deficit? *Exceptional Children*, 1966, 243-248.

Perkins, C. W. and Shannon, D. T. Three techniques for obtaining self-perceptions in pre-adolescent boys. *Journal of Personality and Social Psychology*, 1965, *2*, 443-47.

Perry, H. W. *A perceptual training program for children with learning disorders*. Memphis: Memphis City Schools, 1965.

Petty, M. C. An experimental study of certain factors influencing reading readiness. *Journal of Educational Psychology*, 1939, *30*, 215-230.

Piaget, J. *The construction of reality in the child*. New York: Basic Books, 1954.

Pihl, R. O. Condition procedures with hyperactive children. *Neurology*, 1967, *17*, 421-23.

Pimsleur, P. and Bonkowski, R. Transfer of verbal materials across sense modalities. Journal of Education Psychology, 1961, 52, 104-107.

Pincus, J. H. and Glaser, G. H. The syndrome of minimal brain damage in childhood. New England Journal of Medicine, 1966, 275, 27-35.

Platt, P. Teaching beginning reading to disadvantaged children from pictures children draw. In J. Figurel (Ed.), Reading goals for the disadvantaged. Newark: International Reading Association, 1970.

Polenz, R. An anlaysis of the performance of second grade boys with visual perceptual deficiencies and satisfactory performance on Gray oral reading test. Unpublished doctoral dissertation, 1969.

Poling, D. Auditory deficiencies in poor readers. University of Chicago Reading Clinics, Clinical Studies in Reading, 1949, 2, 107-111.

Posner, M. I., Boies, S. J., Eichelman, W. H., and Taylor, R. L. Retention of visual and name codes of single letters. Journal of Experimental Psychology, 1969, 79, 1-16.

Posner, M. I. and Konick, A. F. Short-term retention of visual and kinesthetic information. Organizational Behavior and Human Performance, 1966, 1, 71-86.

Postman, L. and Rosenzweig, M. R. Practice and transfer in the visual and auditory recognition of verbal stimuli. American Journal of Psychology, 1956, 69, 209-226.

Poteet, J. A. Identification classification and characteristics of first grade students with learning disabilities in reading, writing, and math. Unpublished doctoral dissertation, 1971.

Potter, M. C. Perception of symbol orientation and early reading success. Teachers Contributions to Education. No. 939. New York: Columbia University Press, 1959.

Powell, M. and Parsley, K. M. The relationship between first gaade reading readiness and second grade reading achievement. Journal of Educational Research, 1961, 54, 229-233.

Prechtl, H. F. R. Reading difficulities as a neurological problem of childhood. In J. Money (Ed.), Reading disability. Baltimore: Johns Hopkins University Press, 1962.

Prescott, G. A. Criterion-referenced test interpretation in reading. Reading Teacher, 1971, 24, 347-354.

Preston, R. C. and Yarington, D. J. Status of fifty retarded readers eight years after reading clinic diagnosis. Journal of Reading, 1967, 11, 122-29.

Pribram, K. H. The anmestic syndromes: disturbances in coding? In G. A. Talland and N. C. Waugh (Eds.), Pathology of memory. New York: Academic Press, 1969. (a)

_______. The four r's of remembering. In K. H. Pribram (Ed.), On the biology of learning. New York: Harcourt, Brace and World, 1969. (b)

_______. The neurophysiology of remembering. Scientific American, 1969, 200, 73-80. (c)

Prince George's County Schools, Maryland. Operation bridge: a Title III project for neurologically impaired children. Prince George's County: Special Education Department, 1971.

Quast, W. The Bender-Gestalt: a clinical study of children's records. Journal of Consulting Psychology, 1961, 25, 155-162.

Quay, H. Dimensions of personality in delinquent boys as inferred from factor analysis of case history data. Child Development, 1964, 35, 479-484.

Quereshi, Mohammed Y. Patterns of psycholinguistic development during early and middie childhood. Educational and Psychological Measurement, 1967, 27, 353-65.

Rabinovitch, R. Reading and learning disabilities. In S. Arieti (Ed.), American Handbook of Psychiatry. I. New York: Basic Books, 1959.

_______. Educational achievement in children with psychiatric problems. Bulletin of the Orton Society, 1964, 14, 1-6.

_______. Reading problems in children: definitions and classficiations. In A. H. Keeney and V. Keeney (Eds.), Dyslexia. St. Louis: C. V. Mosby Co, 1968.

Rabinovitch, R. D. and others. A research approach to reading retardation. In R. McIntosh and C. C. Hare (Eds.), Neurology and psychiatry in childhood. Baltimore: Williams and Wilkins Co., 1954.

Rabinovitch, R. D. and Ingram, W. Neuropsychiatric considerations in reading retardation. Reading Teacher, 1962, 15, 433-38.

Rabkin, L. Y. Passive aggressiveness and learning. Exceptional Children, 1965, 32, 1-3.

Rappoport, S. R. (Ed.) Childhood aphasia and brain damage: a definition. Narberth, Pennsylvania: Livingston, 1964.

Rarick, G. and Broadhead, G. Effects of individual vs. group-orientated physical education progaam on selected parameters of educable mentally retarded and minimally brain disabled children. Washington, D. C.: Office of Education (DHEW), 1969.

Rawson, M. B. A bibliography of the nature, recognition, and treatment of language difficulties. Pomfret, Connecticutt: The Orton Society, 1961.

_______. Development language disability: adult accomplishments of dyslexic boys. Baltimore: Johns Hopkins Press, 1968.

Read, M. S. Malnutrition and learning. American Education, December, 1969.

Reed, D. W. A theory of language, speech and writing, In H. Singer and R. B. Ruddell (Eds.), Theoretical models and processes of reading. Newark: International Reading Association, 1970.

Reed, J. C. Lateralized finger agnosia and reading achievement at ages 6 and 10. Child Development, 1967, 38, 113-20. (a)

________. Reading achievement as related to differences between WISC verbal and performance IQ's. Child Development, 1967, 38, 835-40. (b)

________. The ability deficits of good and poor readers. Journal of Learning Disabilities, 1968, 1, 134-39.

________. Teaching reading to brain damaged children: a review. Reading Research Quarterly, 1970, 5, 379-401.

________. Brain damage and learning disabilities. In. L. Tarnopol (Ed.), Learning disorders in children. Little, Brown and Co., Inc., 1971.

Reed, H. and Fitzhugh, K. B. Patterns of deficit in relation to severity of cerebral dysfunction in children and adults. Journal of Consulting Psychology, 1966, 30, 98-102.

Reed, H. and Reitan, R. M. Changes in psychological test performances associated with the normal aging process. Journal of Gerontology, 1963, 13, 271, 274.

Reichstein, J. and Rosenstein, J. Defferential diagnosis of auditory deficits--a review of the literature. Exceptional Children, 1964, 31, 73-82.

Reick, B. J. An investigation of spelling patterns. Unpublished dissertation,1970.

Reitan, R. M. Psychological deficit. Annual Review of Psychology, 1962, 13, 415-444.

________. Psychological deficits resulting from cerebral lesions in man. In J. M. Warren and K. Akert (Eds.), The frontal granular cortex and behavior. New York: McGraw-Hill Book Co., 1964. (a)

________. Relationships between neurological and psychological variables and their implications for reading instruction. In H. A. Robinson (Eds.), Meeting individual differences in reading. Proceedings of the Annual Conference on Reading Supplementary Educational Monographs, 194, 1964. (b)

Report of research. Eye, Ear, Nose, and Throat Monthly, 1966, 45, 76-80.

Report of Secretary's (HEW) National Advisory Committee on dyslexia and related reading disorders. Bethesda, Maryland, 1969.

Restraino, L. C. and Socher, K. Curriculum development for young deaf children with specific learning disabilities. Albany: New York State Education Department, Division for Handicapped Children, 1970.

Reynolds, M. C. The capacities of children. Exceptional Children, 1965, 31, 337-42.

Riess, R. L. and Holroyd, R. G. Central auditory disturbances in dyslexic school children. Journal of Special Education, 1968, 2, 209-16.

Rife, D. C. Heredity and handedness. *Science Monthly*, 1951, *73*, 188-91.

Rimland, B. High dosage levels of certain vitamins in the treatment of children with severe mental disorders. In. D. R. Hawkins and L. Pauling (Eds.), *Orthomolecular Psychiatry*. San Francisco: W. H. Freeman, 1971.

Roach, E. G. Evaluation of an experimental program of perceptual-motor training with slow readers. In J. Figurel (Ed.), *Vistas in reading*. Newark: International Reading Association, 1966.

Roach, E. G. and Kephart, N. C. *Purdue perceptual-motor survey*. Charles Merrill, 1966.

Robbins, M. P. A study of the validity of Delacato's theory of neurological organization. *Exceptional Children*, 1966, *32*, 517-23.

_______. Test of Doman-Delacato rationale with retarded readers. *Journal of the American Medical Association*, 1967, *202*, 389-93.

Robbins, Richard and others. *A model exemplary clinic for learning disabilities: Title III, ESEA.* Riverside, California: Riverside Unified School District, 1967.

Robinson, H. A. A reliability of measures related to reading success of average, disadvantaged and advantaged kindergarten children. *Reading Teacher*, 1966, *20*, 203-209.

Robinson, H. A. and Hanson, E. Reliability of measures of reading achievement. *Reading Teacher*, 1968, *21*, 307-14.

Robinson, Helen M. *Why pupils fail in reading*. Chicago: University of Chicago Press, 1946.

_______. Vocabulary: speaking, listening, reading, and writing In H. A. Robinson (Ed.), *Reading and the language arts*. Proceedings of the Annual Conference on Reading, Vol. 25. Chicago: University of Chicago, 1963.

_______. *Visual and auditory modalities related to two methods for beginning reading*. Unpublished paper presented before the American Educational Research Association, February, 1968.

Robinson, H. M. and Smith, H. K. Reading clinic clients--ten years after. *Elementary School Journal*, 1962, 63, 22-27.

Robinson, H. M., Weintraub, S., and Smith, H. K. Summary of investigations relating to reading, July 1, 1967 to June 30, 1968. *Reading Research Quarterly*, 1969, *4*, 129-316.

Robinson, H., Mozzi, L., Wittick, M. L., and Rosenbloom, A. Children's perceptual achievement forms: a three year study. *American Journal of Optometry*.

Rocky Mountain Educational Laboratory. *Individual learning disabilities program: pilot incidence study*. Volumes *I*, *II*, and *III*. Greenley, Colorado: Rocky Mountain Educational Laboratory.

Roebuck, M. C. Subtest patterns of problem readers on the WISC. *California Journal of Educational Research*, 1960, *39*, 476-78.

_______. Intellectual strengths and weaknesses shown by reading clinic subjects on the WISC. *Journal of Developmental Reading*, 1964, *7*, 120-217.

Rosen, C. L. An experimental study of visual perceptual training and reading achievement in the first grade. *Perceptual and Motor Skills*, 1966, *22*, 979-86.

Rosenfield, A. G. Psycholinguistic abilities as predictors of reading abilities and disabilities in first grade children. Unpublished doctoral dissertation, 1970.

Rosenthal, R. and Jacobson, L. Teacher expectations for the disadvantaged. In J. Stone and F. Schneider (Eds.), *Teaching in the inner city: a book of readings*. New York: Thomas Y. Crowell, 1969.

Rosenthal, T., Zimmerman, B., and Durning, K. Observationally induced changes in children's interrogative classes. *Journal of Personality and Social Psychology*, 1970, 16, 681-688.

Rosner, J. *Application of the IPI model to a perceptual development curriculum.* Pittsburgh University: Learning Research and Development Center, 1969.

Rosner, S. L. Word games in reading diagnosis. *Reading Teacher*, 1971, *24*, 331-35.

Ross, F. A description of twenty arithmetic underachievers. *Arithmetic Teacher*, 1964, *11*, 235-241.

Rossi, Albert O. Genetics of higher level disorders. *Journal of Learning Disabilities*, 1970, *3*, 387-90.

Rossi, E. L. Associative clustering in normal and retarded children. *American Journal of Mental Deficiency*, 1963, *67*, 691-699.

Roswell, F. and Natchez, G. *Reading disability*. New York: Basic Books, 1964.

Rowley, V. N. An analysis of the WISC performance of brain damaged and disturbed children. *Journal of Consulting Psychology*, 1961, *25*, 553-560.

Rowley, V. N., and Baer, P. E. Visual retention test performances in emotionally disturbed and brain damaged children. *American Journal of Orthopsychiatry*, 1961, *31*, 579-583.

Rubenstein, B. O., Folick, M., Levitt, M., and Ekstein, R. Learning problems 2. Learning impotence: suggested diagnostic category. *American Journal of Orthopsychiatry*, 1959, *29*, 315-34.

Rubin, Eli Z. Cognitive dysfunction and emotional disorders. In H. Myklebust (Ed.), *Progress in learning disabilities*. *II*. New York: Grune and Stratton, 1971.

Rubin, Eli Z. and Braun, J. S. *Behavioral and learning disabilities associated with cognitive-motor dysfunction*. U. S. Office of Education, Bureau of Research, Interim Report. Detroit: Lafayette Clinic, 1967. (mimeo.)

Rudnick, M. Sterritt, G., and Flax, M. Auditory and visual rhythm perception and reading ability. *Child Development*, 1967, *38*, 581-87.

Ruhly, V. M. A study of the relationship of self-concept, socioeconomic background, and psycholinguistic abilities to reading achievement of second grade males residing in a suburban area. Unpublished dissertation, 1970.

Russell, D. H. *Children learn to read.* 2nd edition. Boston: Ginn, 1961.

Russell, D. H. and Fea, H. R. Research on teaching reading. In N. Gage (Ed.), *Handbook of research on teaching.* Chicago: Rand McNally, 1963.

Russell, E. V. and Thompson, C. L. *Establishing a reading center, a handbook on remedial and corrective reading instruction.* Winston-Salem: North Carolina Advancement School, 1966.

Russell, W. and Espir, M. *Traumatic aphasia.* London: Oxford University Press, 1961.

Rutherford, W. L. The effects of perceptual motor training program on kindergarten children on metropolitan readiness tests. Unpublished dissertation, North Texas State University, 1964.

________. Perceptual-motor training and readiness. In J. Figurel (Ed.), *Reading and inquiry.* International Reading Association Conference Proceedings, Vol. 10. Newark: International Reading Association, 1965.

________. Teaching reading to children with dialect differences. In J. Figurel (Ed.), Reading goals for the disadvantaged. Newark: International Reading Association, 1970.

Rutter, M., Tezard, J., and Whitmore, K. *Education, health, and behavior.* London: Longman Group Ltd., 1970.

Ryan, E. B. and Semmell, M. I. Reading as a constructive language process. *Reading Research Quarterly*, 1969, *4*, 59-83.

Safford, A. L. and Watts, C. An evaluation of a public school program for educationally handicapped children. *California Journal of Educational Research*, 1967, *28*, 125-131.

Samuels, F. Sex differences in reading achievement. *Journal of Educational Research*, 1943, *36*, 404-503.

Samuels, S. J. Attentional process in reading: the effect of pictures on the acquisition of reading responses. *Journal of Educational Psychology*, 1967, *58*, 337-342.

________. Success and failure in learning to read: a critique of the research. In F. Davis (Ed.), *The literature of research in reading with emphasis on models.* New Brunswick, N. J.: Graduate School of Education, Rutgers, 1971.

Sanstedt, B. Relationship between memory span and intelligence of severely retarded readers. *Reading Teacher*, 1964, *17*, 246-50.

Santucci, H. and Galifret-Granjon, N. *The Bender as a test of perceptual organization.* C. B. Huelsman and Nancy Wood (Eds.), J. D. Frankhart (Trans.). Columbus: Ohio State University Press, 1960.

Sapir, S. and Wilson, B. A developmental scale to assist in the prevention of learning disability. *Educational and Psychological Measurement*, 1967, *27*, 1061-1068.

Satler, G. Psychometric scatter among the mentally retarded and normal children. *The Training School Bulletin*, 1955, *52*, 63-68.

Saunders, M. J. The short auditory span disability. *Childhood Education*, 1921, *8*, 59-65.

Schecter, D. W., Symonds, M., and Bernstein, F. Development of the concept of time in children. *The Journal of Nervous and Mental Disease*, 1955, *121*, 301-310.

Schiffman, G. Dyslexia as an educational phenomenon: its recognition and treatment. In J. Money (Ed.), *Reading disability*. Baltimore: Johns Hopkins Press, 1962.

_______. Early identification of reading disabilities: the responsibility of the public school. *Bulletin of the Orton Society*, 1964, *14*, 42-44.

Schiffman, H. R. Sensory and perceptual aspects of the reading process. In F. Davis (Ed.), *The literature of research in reading with emphasis on models*. New Brunswick: Graduate School of Education, Rutgers, 1971.

Schilder, P. Congenital alexia and its relation to optic perception. *Journal of Genetic Psychology*, 1944, *65*, 67-88.

Schmitt, E. P. Some considerations regarding dyslexia, vision and optometry. *Optometric Weekly*, 1967, *58*, 17-20.

Schonell, Fred J. *Backwardness in the basic subjects*. Edinburgh: Oliver and Boyd, 1942.

Schonell, F., and Schonell, F. E. *Diagnosis and remedial teaching in arithmetic*. Edinburgh: Oliver and Boyd, 1958.

Schuell, H. *Differential diagnosis of aphasia with the Minnesota test*. Minneapolis: University of Minnesota Press, 1965.

Schwaib, E. Correct diagnosis and management of the child with brain dysfunction. *New York Journal of Medicine*, 1967, *67*, 2320.

Scott, R. Perceptual readiness of a predictor of success in reading. *Reading Teacher*, 1968, *9*, 219-22.

Seifert, Joan G. The relationship between visual motor perception and the speed of eye movements by selected boys. Unpublished dissertation, 1968.

Sekyra, Francis III and Arnoult, J. III. Negro intellectual assessment with three instruments contrasting Caucasian and Negro norms. *Journal of Learning*, 1968, *1*, 10.

Senf, G. The linguistically different: learning theories and intellectual development. In Thomas Horn (Ed.), *Reading for the disadvantaged: problems for the linguistically different learners*. New York: Harcou t, Brace and World, 1970.

Senf, G. M., and Feshback, S. Development of a bisensory memory in culturally deprived, dyslexic, and normal readers. *Journal of Educational Psychology*, 1970, *61*, 461-70.

Sequential tests of educational progress (STEP). Princeton: Cooperative Test Service, 1958.

Seymour, Dorothy. Black English. *Intellectual Digest*, 1972, *2*, 78-80.

Shankweiler, D. Developmental dyslexia: a critique and review of recent evidence. *Cortex*, 1964, *1*, 53-61. (a)

_______. Some critical issues concerning developmental dyslexia. In E. W. Franklin (Ed.), *Word-blindness or specific developmental dyslexia*. London: Pitman Medical Publishing Company, 1964. (b)

_______. A study of developmental dyslexia. *Neuropsychological* (Oxford), 1964, *1*, 267-86. (c)

Shaw, M. C. Definition and identification of academic underachievers. In L. Miller (Ed.), *Guidance for the underachiever with superior ability*. Washington, D. C.: Department of Health, Education, and Welfare, 1961.

Shaw, M. C. and Alves, G. J. The self-concept of bright academic underachievers: II. *Personnel and Guidance*, 1963, 42.

Shaw, M. C. and McCuen, J. The onset of academic underachievement in bright children. *Journal of Educational Psychology*, 1960, *51*, 103-108.

Shea, J. *Prep--program for recovery and extending academic potential for high school underachiever seeking college*. Greenfield, Mass.: Greenfield Community College, June, 1966.

Shedd, C. L. *Some exploratory studies on the clinical management of dyslexia*. Paper presented as the Association for Children with Learning Disabilities Conference. Fort Worth, Texas, March 1969.

Sheldon, W. D. and Carrillo, L. Relation of parents, home and certain developmental characteristics to children's reading ability. *Elementary School Journal*, 1952, *52*, 262-70.

Sheldon, W. D. and Cutts, W. C. Relation of parents, home and certain developmental characteristics to children's reading ability, II. *Elementary School Journal*, 1953, *53*, 517-21.

Sherk, J. K., Jr. A study of the effects of a program of visual perceptual training on the progress of retarded readers. Unpublished doctoral dissertation, 1968.

Shores, R. E. Motivational determinants and performance of learning disabled and normal children from differing social class. Unpublished doctoral dissertation, 1970.

Siegel, C. L. The effectiveness of play therapy with other modalities in the treatment of children with learning disabilities. Unpublished doctoral dissertation, 1970.

Siegel, E. Helping the brain-injured child. New York: Association for Brain-Injured Children, 1961.

Siegel, I. E. The attainment of concepts. Review of Child Development Research. New York: Russell Sage Foundation, Vol. I, 1964.

Sievers, D. J. and Essa, S. H. Language development in institutionalized and community mentally retarded children. American Journal of Mental Deficiency, 1961, 66, 414.

Siipala, E. M. and Hayden, S. D. Exploring eidetic imagery among the retarded. Perceptual and Motor Skills, 1965, 21, 275-286.

Silberberg, N. and Silberberg, M. Myths in remedial education. Journal of Learning Disabilities, 1969, 2, 209-217.

Silberberg, N., Iverson, I. and Silberberg, M. Predicting end of first grade developmental reading test scores from reading readiness test scores administered in kindergarten. In Proceedings, 75th Annual Convention, American Psychological Association, 1967.

_______. A model for classifying children according to reading level. Journal of Learning Disabilities, 1969, 2, 634-43.

Silvaroli, N. J. Factors in predicting children's success in first grade reading. In J. Figurel (Ed.), Reading and inquiry. Newark: International Reading Association, 1965.

Silvaroli, N. J. and Wheelock, W. J. An investigation of auditory discrimiantion training for beginning readers. Reading Teacher, 1966, 20, 247-51.

Silver, A. A. Postural and righting responses in children. Journal of Pediatrics, 1952, 41, 493-98.

_______. Behavioral syndrome associated with brain damage in children. Pediatric Clinics of North America, 1958, 5, 687-98.

_______. Diagnostic considerations in children with reading disability. Bulletin of the Orton Society, 1963, 91-100.

Silver, A. A. and Hagin, R. Specific reading disability, delination of the syndrome and relationship to cerebral dominance. Comprehensive Psychiatry, April 1960, 1, 126-34.

_______. Specific reading disability: follow-up studies. American Journal of Orthopsychiatry, 1964, 34, 95-102.

_______. Developmental language disability simulating mental retardation. Journal of the American Academy of Child Psychiatry, 1965, 4, 485-94.

_______. Maturation of perceptual functions in children with specific reading disability. Reading Teacher, 1966, 19, 253-59.

_______. Specific reading disability: an approach to diagnosis and treatment. Journal of Special Education, 1967, 1.

Silver, A., Hagin, R., and Hersh, M. Specific reading disability: teaching through stimulation of deficit perceptual areas. American Journal of Orthopsychiatry, July 1967, 37, 744-52.

Silver, L. B. A proposed view on the etiology of the neurological learning disability syndrome. Journal of Learning Disabilities, March 1971, 4, 123-33.

_______. Familial patterns in children with neurological-based learning disabilities. Journal of Learning Disabilities, 1971, 4.

Silverman, J. W., Fite, M. W. and Mosher, M. Learning problems: clinical findings in reading disability children--special cases of intellectual inhibition. American Journal of Orthopsychiatry, 1959, 29, 298-314.

Simmons, G. A. and Shapiro, B. J. Reading expectancy formulas: a warning note. Journal of Reading, 1968, 11, 626-629.

Simpson, D. M. Perceptual readiness and beginning reading. Unpublished doctoral dissertation. Purdue, 1960.

Singer, H. Substrata-factor patterns accompanying development in power of reading, elementary through college levels. In E. Thurston and L. Hafner (Eds), Philosophical and sociological bases of reading. Milwaukee: National Reading Conference, 1964.

_______. Theories, models, and strategies for learning to read. In F. Davis (Ed.), The literature of research in reading with empahsis on models. New Brunswick: Graduate School of Education, Rutgers, 1971.

Singer, H. and Ruddell, R. B. (Eds.) Theoretical models and processes of reading. Newark: International Reading Association, 1970.

Singer, J. and others. Sex differences in the incidence of neonatal abnormalities and abnormal performance in early childhood. Child Development, 1968, 39, 103-12.

Sister Mary Nila. Foundations of a successful reading program. Education, 1953, 73, 543-555.

Skinner, G. Single vs. Multiple medality in visual and auditory discrimination training. Unpublished doctoral dissertation, 1968.

Sladen, B. K. Inheritance of dyslexia. *Bulletin of the Orton Society*, 1970, *20*, 30-40.

Slingerland, B. H. *Screening tests for identifiying children with specific language disability*. Cambridge: Educator Publishing Service, 1964.

Sloane, H. N and Macaulay, B. *Operent procedures in remedial speech and language training*. Boston: Houghton-Mifflin Co., 1966.

Small, J. G. A psychiatric survey of brain injured children. *Archives of General Psychiatry*, 1962, *7*, 120-124.

Smith, C. B. and others. *Treating reading disabilities*. Bloomington: Indiana University, 1969.

Smith, C. E. and Keogh, B. K. The group Bender-Gestalt as a reading readiness screening instrument. *Perceptual and Motor Skills*, 1962, *15*, 639-645.

Smith, D. E. and Carrigan, P. *The nature of reading disability*. New York: Harcourt Brace and Co., 1959.

Smith, J. M. Utilization of the ITPA with educationally handicapped children. Unpublished doctoral dissertation, 1970.

Smith, L. C. a study of the laterality characteristics of retarded readers and reading achievers. *Journal of Experimental Education*, 1950, *18*, 321-29.

Smith, M. Patterns of intellectual abilities in educationally handicapped children. Unpublished doctoral dissertation, 1970.

Smith, N. Matching ability as a factor in first-grade reading. *Journal of Educational Psychology*, 1928, *19*, 560-571.

Smith, R. and Dechant, T. *Psychology in teaching reading*. Englewood Cliffs: Prentice-Hall, 1961.

Smythe, E. J. and Goldstone S. The time sense: a normative, genetic study of the development of time perception. *Perceptual and Motor Skills*, 1957, *7*, 49-59.

Snyder, M. S. Disabilities in learning symbols. *Acta Symbolica*, 1970, *1*, 16-20.

Solnit, A. J. and Stark, M. Pediatric management of school learning problems of underachievement. New *England Journal of Medicine*, 1959, *261*, 988-93.

Solomons, H. C. A developmental study of tactual perception in normal and brain damaged children. Doctoral dissertation, Boston University, 1957.

Spache, G. *Diagnostic reading scales*. Monterey: California Test Bureau, 1963.

_______. A study of a longitudinal first grade reading readiness program. U. S. Office of Education Cooperative Research Project No. 2747. Washington: U. S. Department of Health, Education, and Welfare, 1965.

Sperling. G. The information available in brief visual presentation. *Psychological Monographs*, 1960, 74.

———. Short-term memory, long-term memory, and scanning in the processing of visual information. In F. A. Young and D. Lindsley (Eds.), *Early experience and visual information processing in perceptual and reading disorders*. Washington: National Academy of Sciences, 1970.

Sperry, B. The internal opponent of thought in relation to children's learning problems. Paper presented at the meeting of the American Psychiatric Association, 1962.

Sperry, B., Staver, N., and Mann, H. Destructive fantasies in certain learning difficulties. *American Journal of Orthopsychiatry*, 1952, *22*, 356-65.

Sperry, B., Staver, N., Reiver, B., and Ulrich, D. Renunciation and denial in learning difficulties. *American Journal of Orthopsychiatry*, 1958, *28*, 99-111.

Sperry, R. W. and Gazzaniga, M. S. Language following surgical disconnection of the hemispheres. In C. H. Millikan and F. L. Darley (Eds.), *Brain mechanisms underlying speech and language*. New York: Grune and Stratton, 1967.

Spitzer, R. L. The relationship between 'mixed dominance' and reading disability. *Journal of Pediatrics*, 1959, *54*, 76-80.

Spivack, G. and Levine. M. The spiral aftereffect and reversible figures as measures of brain damage and memory. *Journal of Personality*, 1957, *25*, 767-778.

Spivak, G., Levine, M. and Sprigle. Intelligence test performance and delay function of the ego. *Journal of Consulting Psychology*, 1959, *23*, 428-31.

Spradlin, J. E. Procesures for evaluating processes associated with receptive and expressive language. In.R. L. Schiefelbusch, R. H. Copeland, and J. O. Smith (Eds.), *Language and mental retardation*. New York: Holt, Rinehart, and Winston, 1967. Pp. 118-136.

Spring, C. Same-different reaction time for letters in dyslexic and normal children. Unpublished doctoral dissertation, 1971.

Springer, D. V. Development of concepts related to the clock as shown in young children's drawings. *Journal of Genetic Psychology*, 1952, *80*, 83-96. (a)

———. Development in young children of an understanding of time and the clock. *Journal of Genetic Psychology*, 1952, *30*, 83-96. (b)

Stagner, R. The relationship of personality to academic aptitude and achievement *Journal of Educational Research*, 1933, *26*, 648-660.

Stallings, J. Reading methods and sequencing abilities: an interaction study in beginning reading. Unpublished dissertation, 1971.

Stark, S. Demographic, personal and social system variables in labeling children as educably handicapped. Unpublished doctoral dissertation, 1971.

Staats, A. W. and Staats, C. K. A comparison of the development of speech and reading behaviors with implications for research. *Child Development*, 1962, *33*, 831-846.

Staats, A. and others. *A token-reinforcement remedial reading program administered by instructional technicians*. Madison: Wisconsin University, Research and Development Center for Cognitive Learning, May, 1970.

Stephens, W. E., Cunningham, E. S.. and Stigler, B. J. Reading readiness and eye-hand preference patterns in first grade children. *Exceptional Children*, 1967, *33*, 481-88.

Stern, C. *Children discover arithmetic*. New York: Harpers, 1949.

Sterritt, G. and Rudnick, M. Auditory and visual rhythm perception in relation to reading ability in fourth grade boys. *Perceptual and Motor Skills*, June 1966, *22*, 859-64.

Sterritt, G., Martin, V., and Rudnick, M. The role of visual perception: sequential pattern of perception and reading. In G. Spache (Ed.), *Reading disability and perception*. Newark: International Reading Association, 1969.

Stevens, G. and Birch, J. A proposal for classification of the terminology used to describe brain-injured children. *Exceptional Children*, 1957, *23*, 346-49.

Stewart, R. S. Personality maladjustment and reading achievement. *American Journal of Orhtopsychiatry*, 1950, *20*, 410-17.

Stewart, W. Negro dialect in the teaching of reading. In J. Baratz and W. Shuy (Eds.), *Teaching black children to read*, 1970.

Stodolsky, S. and Lesser, G. Learning patterns in the disadvantaged. *Harvard Educational Review*, 1967, *37*, 546-93.

Stone, E. A follow-up study of off-campus students who attended the University of Florida reading laboratory and clinic. Unpublished dissertation, 1968.

Stove, F. and Rowley, V. Educational disability in emotionally disturbed children. *Exceptional Children*, 1964, *30*, 423-26.

Stone, J. C. *Teachers for the disadvantaged*. San Francisco: Jossey-Bass, 1969.

Stone, J. and Schneider, F. *Teaching in the inner city: a book of readings*. New York: Thomas Y. Crowell, 1970.

Strang, R. *Diagnostic teaching of reading*. New York: McGraw-Hill, 1964.

______. *Reading diagnosis and remediation*. Newark: International Reading Association Research Fund, 1968.

Strauss, A. Finger agnosia in children. *American Journal of Psychiatry*, 1939, *95*, 1215-1225.

______. Ways of thinking in brain-crippled deficient children. *American Journal of Psychiatry*, 1944, *100*, 639-647.

_______. The education of the brain-injured child. American Journal of Mental Deficiencies, 1951, 56, 712-718.

_______. Aphasia in children. American Journal of Physical Medicine, 1954, 33, 93-99.

Strauss, A. A. and Kephart, N. C. Psychopathology and education of the brain-injured child: II. Progress in Clinic and theory. New York: Grune and Stratton, 1955.

Strauss, A. A. and Lehtinen, L. Psychopathology and education of the brain-injured child. New York: Grune and Stratton, 1947.

Strauss, A. A. and McCarus, E. N. A linguist looks at aphasia in children. Journal of Speech and Hearing Disorders, 1958, 23, 54-58.

Strauss, A. A. and Werner, H. Deficiency in the finger scheme in relation to arithmetic disability (finger agnosia and acalculia). American Journal of Orthopsychiatry, 1938, 8, 719-725.

_______. Disorders of conceptual thinking in the brain-injured child. Journal of Nervous Mental Disorders, 1942, 96, 153-172.

_______. Comparative psychopathology of the brain-injured and the traumatic brain-injured adult. American Journal of Psychiatry, 1943, 99, 835-840.

Strother, Charles R. Discovering, evaluating, programming for the neurologically handicapped child. Chicago: National Society for Crippled Children and Adults, 1963.

Stroud, J. B. Psychology in education. New York: Longmans, Green and Co., 1956.

Stuart, M. F. Neurophysiological insights into teaching. Palo Alto, California: Pacific Books, 1963.

Sturt, M. The psychology of time. New York: Harcourt, Brace and World, 1925.

Subirana, A. The problem of cerebral dominance: the relationship between handedness and language function. Logos, 1961, 4, 67-85.

Summerfield, A. (Ed.) Cognitive Psychology. British Medical Bulletin, 1971, 27, 3.

Summers, E. G., Davis, C. H., and Siffin, C. F. Published research literature in reading, 1950-1963. Bloomington: ERIC/CRIER Center, Indiana University, 1967.

_______. Published research literature in reading, 1900-1949. Bloomington: ERIC/CRIER Center, Indiana University, 1968. (a)

_______. Published research literature in reading, 1964-1966. Bloomington: ERIC/CRIER Center, Indiana University, 1968. (b)

Sutton, M. Readiness for reading at the kindergarten level. Reading Teacher, 1964, 17, 234-40.

Svagr, V. *Teaching upper elementary students with severe learning disabilities.* Oakland: Oakland Unified School District, December, 1968.

Swanson, E. M. Perceptual motor performance and reading and number readiness in kindergarten as predictors of achievement in first grade. Unpublished masters thesis. Purdue, 1963.

Swanson. R. A study of the relationship between perceptual-motor skills and learning of word recognition. Unpublished doctoral dissertation, 1969.

Taba, H., Levine, S., and Freeman, F. *Thinking in elementary school children.* Cooperative Research Program of the Office of Education, DHEW, 1964.

Tannhauser, M. T. Instituting a public school program for the neurologically impaired child: criteria, programming, management. In J. Helmuth (Ed.), *The special child in century 21*. Seattle: Special Child Publications, 1964.

Tarnapol, L. Testing the educationally handicapped child. *Academic Therapy Quarterly*, 1967, *3*, 81.

_______. *Learning disabilities: introduction to educational and medical management*. Springfield: Charles C. Thomas, 1969.

_______. Delinquency and minimal brain dysfunction. *Journal of Learning Disabilities*, 1970, *3*, 200-07.

Tauber, R. Identification of potential learning disabilities. *Academic Therapy Quarterly*, 1966-67, *2*, 116-19, 123.

Taylor, E. A. *The fundamental reading skill*. Springfield: Charles C. Thomas, 1966.

Taylor, E. M. *Psychological appraisal of children with cerebral defects*. Harvard University Press, 1959.

Taylor, S. E. *Eye movement photography with the reading eye*. New York: Educational Developmental Laboratories,1960.

Teahan, J. E. Future time perspective, optimism, and academic achievement. *Journal of Abnormal and Social Psychology*, 1956, *52*, 240-245.

Teegarden, L. Clinical identification of the prospective non-reader. *Child Development*, 1932, *3*, 346-58.

Templin, M. *Certain language skills in children*. Monograph Series No. 26, Minneapolis: Institute of Child Welfare, University of Minnesota, 1957.

Teuber, H. Physiological psychology. *Annual Review of Psychology*, 1955, *6*, 267-96.

Teuber, H. and Rudel, R. Behavior after cerebral lesions in children and adults. *Developmental Medicine and Child Neurology*, 1962, *4*, 3-20.

Texas Education Agency. *Guidelines for the implimentation of the program for minimal brain injured children: a supplement to the administrative guide and state program for special education*. Austin: Texas Education Agency, 1965.

Thelander, H. E., Phelps, J., and Kisk, E. Learning disabilities associated with lesser brain damage. Journal Of Pediatrics, 1958, 53, 405-409.

Thomas, A., Chess, S., and Birch, G. Temperament and behavior disorders in children. New York: University of London Press, 1968.

Thompson, L. J. Reading disability: developmental dyslexia. Springfield: Charles C. Thomas, 1966.

Thorndike, R. L. The concepts of over- and under-achievement. New York: Teachers College Press, 1963.

Thurston, D., Middlekamp, J., and Mason, E. The late effects of lead poisoning. Journal of Pediatrics, 1955, 47, 413-423.

Thurstone, T. G. An evaluation of educating mentally handicapped children in special classes and in regular classes. Chapel Hill: School of Education, University of North Carolina, 1959.

Tinker, M. Fixation pause duration in reading. Journal of Educational Research, 1951, 44, 471-479.

Tjossem, T. D. and others. An investigation of reading difficulty in children. American Journal of Psychiatry, 1962, 118, 1104-1113.

Touwen, B. C. L. and Prechtl, H. F. R. The neurological examination of the child with minor nervous dysfunction. Clinics in Developmental Medicine #38, Spastics International, Medical Publications. London: Wm. Heineman, 1970.

Travers, K. J. and others. Teaching resources for low-achieving mathematics classes. Columbus: ERIC Information Analysis Center for Science Education, 1971.

Tuckman, B. W. and O'Brian, J. L. Preparing to teach the disadvantaged. New York: The Free Press, 1969.

Tulving, E., Madigan, S. Memory and verbal learning. Annual Review of Psychology, 1970, 21, 437-84.

Ullman, C. A. Prevalence of reading disabilities as a function of the measure used. Journal of Learning Disabilities, 1969, 2, 556-558.

Union Township Board of Education. A program for the identification and remediation of perceptual deficiencies in kindergarten and primary grade students. Interim Progress Report. Union Township, New Jersey: Union Township Board of Education, 1968.

University of New York at Albany. Teaching aids for children with cerebral palsy. Albany: University of New York, 1966.

Ussery, L. E. An experimental investigation of learning and performance in children with academic disabilities. Unpublished dissertation, 1968.

Valett, Robert E. A psychoeducational inventory of basic learning abilities. Belmont, California: Fearon Publishers, 1968.

Van Riper, C. *Speech correction: principles and methods*. Englewood Cliffs: Prentice-Hall, 1963.

Vernon, M. D. *Backwardness in reading: a study of its nature and origin*. Cambridge: Cambridge University Press, 1957.

Vernon, P. E. The determinants of reading comprehension. *Educational and Psychological Measurement*, 1962, *22*, 269-86.

Versacci, C. An epidemiological study of the relation between children's birth record information and reading achievement. *Dissertation Abstracts*, 1966, 27, 37-40.

Vinken, P. J. and Bruyn, G. W. (Eds.) *Handbook of clinical neurology*. *IV*. *Disorders of speech, perception, and symbolic behavior*. Chs. 18, 19, 20, 21, 22, and 23. Amsterdam: North Holland Publishing, 1969.

Vuckovich, D. M. Pediatric neurology and learning disabilities. In H. Myklebust (Ed.), *Progress in learning disabilities*. *II*. New York: Grune and Stratton, 1968.

Vuillemot, L. O. Implimentations of special education. Bruner, Illinois: Intermediate School District, Lake County Special Education District, 1966.

Wagenberg, Renee and Blau, H. Hyperlexia: the problem of the wordy child. *Academic Therapy*, Summer 1971, *4*, 411-416.

Wagenheim, L. The effect of childhood diseases on IQ variability. *Journal of Consulting Psychology*, 1954, *19*, 354.

Wagner, G. The maturation of certain visual function and the relationship between these functions and success in reading and arithmetic. *Psychological Monographs*, 1937, *48*, 108-146.

Walker, L. and Cole E. Familial patterns of expression of specific reading disability: Part 1, prevalence, distribution and persistence. *Bulletin of the Orton Society*, 1965, *15*, 12-24.

Wallace, M. Future time perspective in schizophrenia. *Journal of Abnormal and Social Psychology*, 1956, *52*, 240-245.

Wallach, M. Research on children's thinking. In H. Stevenson (Ed.), *Child Psychology*. 62nd Yearbook, National Society for the Study of Education. Chicago: University of Chicago Press, 1963.

Wallin, J. E. An historical conspectus on the existence of congenital word blindness. *Journal of Special Education*, 1968, *2*, 203-7.

Walsh, A. M. *Self concepts of bright boys with learning difficulties*. New York Bureau of Publications, Teachers College, Columbia University, 1956.

Walsh, J., O'Connor, Sister J. When are children disturbed? *Elementary School Journal*, 1968, *68*, 353-356.

Walters, C. E. Reading ability and visual-motor functions in second grade children. *Perceptual-Motor Skills*, 1961, *13*, 370.

Walters, R. and Doan, H. Perceptual and cognitive functions of retarded readers. *Journal of Consulting Psychology*, 1962, *26*, 355-361.

Walters, R. and Kowowski, I. Symbolic learning and reading retardation. *Journal of Consulting Psychology*, 1963, *27*, 75-82.

Walton, H. N. Vision and rapid reading. *American Journal of Optometry* and *Archives of the American Academy of Optometry*, 1957, 203.

Wanat, S. F. Linguistic structure in reading: models from the research of Project Literacy. In F. Davis (Ed.), *The literature of research in reading with emphasis on models*. New Brunswick: Graduate School of Education, Rutgers, 1971.

Wardhaugh, R. Theories of language acquisiton in relation to beginning reading instruction. *Reading Research Quarterly*, 1971, *7*, 168-194.

Wass, H. E. Relationship of social-psycholigical variables to school achievement for high and low achievements. Unpublished dissertation, 1969.

Wattenberg, W. and Clifford, C. Relation of self-concepts to beginning achievement in reading. *Child Development*, 1964, *35*, 461-467.

Waugh, N. C. Primary and secondary memory in short-term retention. In K. H. Pribram and D. E. Broadbent (Eds.), *Biology of memory*. New York: Academic Press, 1970. Pp. 63-66.

Weaver, A. S. The prediction of first grade reading achivement in culturally disadvantaged children. Unpublished dissertation, 1968.

Weener, P., Barritt, L. S., and Semmel, M. A critical evaluation of the Illinois test of psycholinguistic abilities. *Exceptional Children*, 1967, *33*, 373-87.

Weiner, P. S., Wepman, J., and Morency, A. A test of visual discrimination. *Elementary School Journal*, 1965, *330*, 337.

Weiner, M. and Feldman, S. Validation studies of a reading prognosis test for children of lower and middle socioeconomic status. *Educational and Psychological Measurement*, 1950, *23*, 807-814.

Weiss, G., Werry, J., Minde, K., Douglas, V., and Shkes, D. Studies on the hyperactive child, V: the effects of dextroamphetamine and chlorpromazine on behavior and intellectual functioning. *Journal of Child Psychology and Psychiatry*. In press.

Weissman, S. L. and Crockett, W. Intersensory transfer in the visual and auditory recognition of verbal stimuli. *American Journal of Psychology*, 1957, *70*, 283-285.

Wells, R. *Exceptional pupils*. Indianapolis: Office of the State Superintendant of Public Instruction, 1968.

Wepman, J. M. *Auditory discrimination test*. Chicago: Language Research Associates, 1958.

_______. Auditory discrimination, speech and reading. *Elementary School Journal*, 1960, *30*, 333.

_______. *A selected bibliography on brain impairment, aphasia and organic psychodiagnosis*. Chicago: Language Research Association, 1962.

Wepman, J., Jones, L., Bock, R., and Pelt, D. Studies in aphasia: background and theoretical formulations. *Journal of Speech and Hearning Disorders*, 1960, *25*, 323-332.

Werner, H. and Kaplan, B. *Symbol formation: an organismic-developmental approach to language and the expression of thought*. New York: Wiley, 1963.

Werner, H. and Strauss, A. A. Pathology of figure-ground relation in the child. *Journal of Abnormal and Social Psychology*, 1941, *36*, 58-67.

Werner, H. and Thuma, B. D. Critical flicker frequency in children with brain injury. *American Journal of Psychology*, 1942, *55*, 394-400. (a)

_______. A deficiency in the perception of apparent-motion in children with brain injury. *American Journal of Psychology*, 1942, *55*, 58-67. (b)

Werner, H. and Weir, A. The figure-ground syndrome in the brain-injured child. *International Record of Medicine* and *General Practice Clinics*, 1956, *169*, 362-367.

Werry, J. Studies on the hyperactive child, IV. An empirical analysis of the minimal brain dysfunction syndrome. *Archives of General Psychiatry*, 1968, *19*, 9-16.

Wide Range Achievement Test, revised edition. Psychological Corportaion, 1965.

Wiener, G. The Bender-Gestalt test as a predictor of minimal neurologic deficit in children 8-10 years of age. *Journal of Nervous and Mental Disorders*, 1966, *143*, 275-280.

Weiner, M. and Cromer, W. Reading and reading difficulty: a conceptual analysis. *Harvard Educational Review*, 1967, *37*, 620-43.

Wilderson, F. B. An exploratory study of reading skill deficiencies and psychiatric symptoms in emotionally disturbed children. *Reading Research Quarterly*, 1967, *2*, 47-73.

Wilhelm, R. Diagnostic value of test score differentials found between measures of visual and auditory memory in severely disabled readers. *Academic Therapy Quarterly*, 1966, *2*, 42-44.

Willard, L. S. A comparison of culture fair test with group and individual intelligence. Test scores of disadvantaged Negro children. *Journal of Learning Disabilities*, 1968, *1*, 584-589.

Williams, F. *Language and poverty*. Chicago: Markham Publishing Co., 1970. (a)

———. Some preliminaries and prospects. In F. Williams (Ed.), *Language and poverty*. Chicago: Markham Publishing Co., 1970. Pp. 1-10. (b)

Williams, J. P. Learning to read: six papers in search of a model. In F. Davis (Ed.), *The literature of research in reading with emphasis on models*. New Brunswick: Graduate School of Education, Rutgers, 1971. (b)

———. Learning to read: a review of theories and models. In F. Davis (Ed.), *The literature of research in reading with emphasis on models*. New Brunswick: Graduate School of Education, Rutgers, 1971. (b)

Williams, R. J. The nutritive value of single foods. Report delivered to the National Academy of Sciences, April 28, 1971.

Willson, Margaret F. Clinical teaching and dyslexia. *Reading Teacher*, 1968, *21*, 730-33.

Wilson, F. and Burke, A. Reading readiness in a progressive school. *Teachers College Record*, 1937, *38*, 565-530.

Wilson, F., Flemming, C., Burke, A., and Garreson, C. Reading progress in kindergarten and primary grades. *Elementary School Journal*, 1938, *38*, 442-49.

Wilson, R. *Diagnostic and remedial reading*. Columbus: Merrill, 1967.

Winfield, D. L. Emotional disturbances of the brain damaged child with reference to the electroencephalogram. *Memphis Mid-South Medical Journal*, 1961, *36*, 403-406.

Winick, M. Changes in nucleic acid and protein content of the human brain during growth. *Pediatric Research*, 1968, *2*, 352-355.

Winick, M. and Rosso, P. The effect of severe early malnutrition on cellular growth of the human brain. *Pediatric Research*, 1969, *3*, 181-184.

Witchita Unified School District. *Special education diagnostic and resource center project*. ESEA--Title III. Evaluation Report, 1967.

Witty, P. A. and Kopel, D. Causation and diagnosis of reading disability. *Journal of Psychology*, 1936, *2*, 161-91. (a)

———. Factors associated with the etiology of reading disability. *Journal of Educational Research*, 1936, *29*, 449-59. (b)

White, M. and Charry, J. (Eds.). *School disorder, intelligence and social class*. New York: Teachers College Press, 1966.

Whitesell, L. Neurological aspects of reading disorders. In R. Flower, H. Gofman, and L. Lawson, (Eds.), *Reading disorders*. Philadelphia: F. A. Davis, 1965.

Wolf, C. An experimental investigation of specific language disability. Bulletin of the Orton Society, 1967, 17.

_______. A statistical study of specific dyslexia. Unpublished doctoral dissertation, University of Houston, 1968.

Wolf, M. Emotionally disturbed and school achievement. Journal of School Psychology, 1965, 4, 16-18.

Wolf, M. and others. Experiments with token reinforcement in a remedial classroom, 1966.

Wolfe, L. S. Differential factors in specific reading disability. I. Laterality of function. Journal of Genetic Psychology, 1941, 58, 45-56.

Wood, N. Language disorders in children. Chicago: National Society for Crippled Children and Adults, 1959.

_______. Language development and language disorders: a compendiam of lectures. Monograph of the Society for Research in Child Development, Purdue University, 1960, No. 77, 25.

Woodson, D. The behavioral and academic achievement variations related to three different administrative class structures for children with learning disabilities. Unpublished doctoral dissertation, 1970.

Woody, C. The arithmetical backgrounds of young children. Journal of Educational Research, 1931, 24, 199-201.

Woody, C. and Phillips, A. The effects of handedness of reversals in reading. Journal of Educational Research, 1934, 27, 651-62.

Wortis, J. A note on the concept of the 'brain-injured child'. American Journal of Mental Deficiencies, 1956, 64, 204-206.

Wrigley, J. The factorial nature of ability in elementary mathematics. British Journal of Educational Psychology, 1958, 28, 61-78.

Wyckoff, C. W. Strephosymbolia: pediatric and pedagogic problem. Journal of Pediatrics, 1943, 23, 95-100.

Yates, A. J. Psychological deficit. Annual Review of Psychology, 1966, 17, 111-44.

Yedinack, J. A study of the linguistic functioning of children with articulation and reading disabilities. Journal of Genetic Psychology, 1949, 74, 23-59.

Young, F. A., and Lindsley D. B. (Eds.) Early experience and visual information processing in perceptual and reading disorders. Washington, D. C.: National Research Council, 1970.

Zangwill, O. L. Cerebral dominance and its relation to psychological function. Edinburgh: Oliver and Boyd, 1960.

_______. Dyslexia in relation to cerebral dominance. In J. Money (Ed.), Reading Disability. Baltimore: Johns Hopkins Press, 1962. Pp. 103-13. (a)

_______. The Johns Hopkins dyslexia conference. *Developmental Medicine and Child Neurology*, 1962, *4*, 205-9. (b)

Zbinden, W. R. Psycholinguistic and perceptual correlates of spelling in educable mentally handicapped children. Unpublished dissertation, 1970.

Zedler, E. (Chmn.) *Research conference on the problems of dyslexia and related disorders in public schools of the United States*. Final Report, Project No. 7-8270, Grant #OEG 7-078270-2684. San Marcos: Southwest Texas State College, 1967. (a)

_______. A screening scale for children with high risk of neurological impairment. *International approach to learning disabilities of children and youth*. Selected Conference Papers. Tulsa, Oklahoma, 1967. (b)

_______. Educational programming for pupils with neurologically based language disorders. *Journal of Learning Disabilities*, 1970, *3*, 618-28.

Zigmond [illegible]. Intrasensory and intersensory processes in normal and dyslexic children. Unpublished doctoral dissertation, Northwestern University, 1966.

Zimmerman, I. L. and Allebrand, G. Personality characteristics and attitude toward achievement of good and poor readers. *Journal of Educational Research*, 1965, *59*, 28-30.

Zucker, J. and Stricker, G. Impulsivity-reflectivity in preschool headstart and middle class children. *Journal of Learning*, 1968, *1*, 578-583.

PERSONNEL TRAINING PRACTICES IN LEARNING DISABILITIES

Corrine E. Kass

with

Donald D. Deshler

Charles Kaiser

Joseph Wade

August 1972

INTRODUCTION

At the present time (1971-72), there are 38 training programs funded under Public Law 91-230, Part D, in the field of learning disability. Seventy-seven institutions had submitted applications for federal funds under this law. The number of federally-funded personnel training programs has tripled in the six years since 1966 when 11 institutions of higher education were awarded federal funds by the USOE.

State Education Agencies have also received funds under Public Law 91-230, Part D, for fellowships and traineeships in learning disabilities. In 1971-72 two states awarded three post-master's level fellowships; nine states awarded eleven master's level fellowships; two states awarded two senior year traineeships; one state awarded one junior year traineeship; 20 states awarded 294 summer session traineeships; and 21 states funded 26 special study institutes which provide in-service training for 2,924 teachers.

Three special project grants in learning disabilities were made in 1971-72 to Dr. Howard Adelman, University of California-Riverside ("A Competency-Based Model Training Program"); to Dr. Keith Beery, Institute for Independent Educational Research, San Raphael, California ("Project Catalyst"); and to Dr. Janet Lerner, Northwestern University, Evanston, Illinois ("Computer Application in the Field of Learning Disabilities"). The purpose of these grants is to plan and implement new models of training and to evaluate the effectiveness and efficiency of these new models in preparing personnel to work with handicapped children.

The purposes of this paper are to provide: (a) a historical overview of major national events in the development of personnel training in the field of learning disabilities, (b) a discussion of current program practices (1971-72), (c) a brief look at in-service training, (d) a review of certification practices, (e) implications of Program Assistance Grants (1972-73), and (f) a concluding statement.

HISTORICAL PERSPECTIVE

Since 1958, federal funds have been available for the preparation of professional personnel in the education of handicapped children and for research and demonstration projects relating to the education of these children under Public Law 85-926, as amended. As defined in this law, "the term 'handicapped children' includes mentally retarded, hard of hearing, deaf, speech impaired, visually handicapped, seriously emotionally disturbed, crippled, or other health impaired children who by reason thereof require special education and related services." Children with learning disabilities were included in the clause "crippled, or other health impaired children who by reason thereof require special education and related services."

On April 13, 1969, President Nixon signed Public Law 91-230, Title VI, Education of the Handicapped Act, which included Part G, Special Programs for Children with Specific Learning Disabilities. Federal monies became available for research, training, and model centers. Specifically, the legislation calls for programs of

1. research and related activities, surveys, and demonstrations relating to the education of children with specific learning disabilities;

2.· professional or advanced training for educational personnel who are teaching or preparing to be teachers of, children with specific learning disabilities, or such training for persons who are, or prepared to be, supervisors and teachers of such personnel; and

3. establishing and operating model centers for the improvement of education of children with specific learning disabilities, which centers shall (a) provide testing and educational evaluation to identify children with specific learning disabilities who have been referred to such center, (b) develop and conduct model programs designed to meet the special education needs of such children and (c) to assist appropriate educational agencies, organizations, and institutions in making such model programs available to the children with specific learning disabilities.

One million dollars was appropriated for 1971-72, and this money has been spent to fund eight State Department Child Service Demonstration Programs and one Leadership Training Institute in Learning Disabilities. California, Colorado, Mississippi, New Jersey, Ohio, Utah, Washington, and Wisconsin are receiving the state grants. The University of Arizona is the recipient of the Leadership Training Institute grant.

The major national events preceding Public Law 91-230, Part G, which have contributed to the development of personnel training in learning disabilities are:

1. In 1963, a committee was organized by a number of interested governmental and private agencies for purposes of considering the problems of children whose overall intelligence appeared normal, but who exhibited deficiencies of mental processes which interfered with their ability to cope with some educational requirements. This committee recommended the establishment of three Task Forces. This sponsoring organizations were (a) the National Institute of Neurological Diseases and Blindness, U. S. Department of Health, Education, and Welfare, (b) the Easter Seal Research Foundation, National Society for Crippled Children and Adults, Inc., (c) the U. S. Office of Education, Department of Health, Education and Welfare and (d) the Neurological and Sensory Disease Control Program, Division of Chronic Diseases, U. S. Public Health Service.

The report of Task Force I (Clements. 1966), entitled Minimal Brain Dysfunction in Children, was published in 1966. Task Force I was concerned with terminology and definition. It recommended the label "minimal brain dysfunction" rather than "learning disability" because the disturbances in learning behavior which are attributed to a dysfunction of the nervous system extend further than the classroom learning situation. This Task Force defined children with minimal brain dysfunction as

> . . . children of near average, average, or above average general intelligence with certain learning and/or behavioral disabilities ranging from mild to severe, which are associated with deviations of function of the central nervous system. These deviations may manifest themselves by various combinations of impairment in perception, conceptualization, language, memory, and control of attention, impulse or motor function. These aberrations may arise from genetic variations,

> biochemical irregularities, perinatal brain insults or other illnesses or injuries sustained during the years which are critical for the development and maturation of the central nervous system, or from other unknown organic causes.

Task Force II (Haring and Miller, 1969) reported on their analysis of the educational and medical services required for children with minimal brain dysfunction--learning disability. The report of Task Force II, entitled Minimal Brain Dysfunction in Children, Education, Medical and Health Related Services, was published in 1969.

Section IV of the Task Force II report (Haring, Reid, and Beaber, 1969) deals specifically with an analysis of professional preparation taken from a brief history of special education and current program content. A historical perspective of principles of instruction is presented for use in the preparation of evaluation guidelines.

Task Force III (Chalfant and Scheffelin, 1969) presented a review of research and scientific knowledge regarding central processing dysfunctions. Its report summarizes current facts and also points out gaps in scientific understanding. In the preface, Richard L. Masland describes this report as:

> . . . a remarkable and comprehensive piece of work, highlighting above all the diversity of problems which are involved and the variety of scientific disciplines whose contributions will be required for their solution. A major problem has been the breadth of the topic and the massive literature which has been reviewed (the book includes 848 citations, but over 3,000 references are in the file). Wide gaps of knowledge exist in every area, and one is almost overwhelmed by the questions in need of elucidation.
>
> The final summary of research needs highlights the chaotic state of our current efforts in this field. We are dealing with a poorly defined population. The methods for early recognition of the child with learning difficulties are still to be worked out and tested. There is no standard or generally accepted systematic screening program through which every child could be tested for a learning disability. The characterization of the individual deficit is on a very superficial basis, with the emphasis dependent largely upon the biases of one or another special school of thought. Remedial methods are found to rest on varied and shaky hypotheses and have rarely been subjected to scientific evaluation even on an empirical basis.

2. A national parent group, the Association for Children with Learning Disabilities (ACLD), was organized in 1963 for the purpose of "advancing the education and general well-being of children with adequate intelligence who have learning disabilities arising from perceptual, conceptual or subtle coordinative problems sometimes accompanied by behavior difficulties" (Arena, 1969, p. iii). The annual conferences held by the Association have been popular with professional personnel. Beginning with the 1967 ACLD conference in New York, the directors from federally-funded learning-disability programs met each year to exchange information. In addition, they provided an answering service for those who wished information about program development and proposal writing.

3. As part of a federally-funded Regional Project on Training and Research (Fudell, 1967), the Southern Regional Education Board conducted a study of "educational provisions and the preparation of classroom teachers for children with learning disabilities in the South, 1964-65." The 15 member states were Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia. Questions about present and future needs for teachers were asked of the 15 State Departments and some 400 institutions of higher education. This study estimates 11,000 teachers would be needed in the 15 states to handle a one percent prevalence figure. Ten instituions offered complete programs and 18 had partial programs. Forty teachers were certified by these 28 institutions in 1965. The teacher training was handled by the equivalent of 12 full-time faculty members, and the projected needs for 1968-69 were over 31 faculty members. Recruitment of both students and faculty was considered important in planning and implementing teacher training programs.

4. In August 1966, a Unit on Learning Disorders and Interrelated Areas was added to the Division of Training Programs, Bureau of Education for the Handicapped, U.S. Office of Education. This new unit had two types of programs under its responsibility: (a) interrelated areas, i.e., the education of children with combination handicaps such as deaf-blind and blind-retarded; and (b) the rapidly expanding area of learning disabilities, or minimal brain dysfunction. A primary activity of the unit was to assist in the administration of Public Law 85-926, as amended, relative to the preparation of teachers for these two types of programs. Previously, training funds for personnel preparation in learning disabilities had come out of the Unit on Crippled and Other Health Impaired.

5. In October, 1966, a meeting of the administrators of 11 federally-funded programs in learning disabilities was held at the University of Kansas, Lawrence, Kansas. The 11 institutions represented at this meeting were University of California at Los Angeles, DePaul University, University of Florida, George Peabody University, University of Illinois, University of Kansas, Northwestern University, San Francisco State College, University of Virginia, University of Washington, University of Wisconsin-Milwaukee. The purpose of this meeting was to provide for an exchange of information regarding programs which were then in an experimental stage of development. The problems surrounding a label and definition were not yet resolved; however, a strong feeling of growing professional identification permeated this conference.

6. An Advanced Study Institute of 15 selected special educators was held at Northwestern University, Evanston, Illinois in the summer of 1967. This meeting was held for the purpose of the development of educational definitions

of a learning disability and multiple handicaps. Multidisciplinary definitions had been unsuccessful in the past and it was felt that special education needed its own definitions for these two emerging areas of exceptionality. The resulting definition for learning disability was the following:

> Learning disability refers to one or more significant deficits in essential learning processes requiring special education techniques for remediation.
>
> Children with learning disability generally demonstrate a discrepancy between expected and actual achievement in one or more areas, such as spoken, read, or written language, mathematics, and spatial orientation.
>
> The learning disability referred to is not primarily the result of sensory, motor, intellectual, or emotional handicap, or lack of opportunity to learn.
>
> *Significant deficits* are defined in terms of accepted diagnostic procedures in education and psychology.
>
> *Essential learning processes* are those currently referred to in behavioral science as involving perception, integration, and expression either verbal or nonverbal.
>
> *Special education techniques* for remediation refers to educational planning based on diagnostic procedures and results (Kass and Myklebust, 1969).

7. The National Advisory Committee on Handicapped Children reported to Congress in 1967 that one of the areas of special needs among the handicapped was children with learning disabilities. This group identified an urgent need for more extensive research on etiology, diagnosis, and remediation for this condition, and an even more urgent need for trained personnel, particularly for personnel in special education. The definition suggested by the National Advisory Committee as a guideline for legislative purposes was the following:

> Children with special learning disabilities exhibit a disorder in one or more of the basic psychological processes involved in understanding or in using spoken or written language. These may be manifested in disorders of listening, thinking, talking, reading, writing, spelling, or in arithmetic. They include conditions which have been referred to as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, developmental aphasia, etc. They do not include learning problems which are due primarily to visual, hearing, or motor handicaps, to mental retardation, emotional disturbance, or to environmental disadvantage.

This definition appears in a report by the National Advisory Committee on Handicapped Children to the Bureau of Education for the Handicapped (1968).

8. The Division for Children with Learning Disabilities (DCLD) was organized within the Council for Exceptional Children (CEC) in 1968. The purpose of this organization is to promote the education and general welfare of children with specific learning disabilities through:

> improving teacher preparation programs,
>
> improving local special education programs,
>
> resolving the research issues,
>
> coordinating activities with other divisions of CEC and with professional organizations outside the Council structure.

9. The Bureau of Education for the Handicapped, through its Unit on Learning Disabilities, supported an Advanced Institute for Leadership Personnel in Learning Disabilities in 1969 in Tucson, Arizona (Kass, 1970). Eighty-seven participants were involved in working sessions devoted to the discussion of (a) specific roles and functions of teachers of children with learning disabilities, and (b) the implications for preparing such personnel.

Previously, in a variety of professional meetings, many of these same participants had repeatedly discussed (a) labeling and definition, and (b) teacher training. A wide diversity of professional training and experience had always been reflected in those who attended these meetings. Inherent in their diversity was a major communication problem due to differing terminology and concepts. However, through the continuing exchange of information and ideas (and sometimes even compromise) the leadership personnel in learning disabilities were able to acquire common identifications. In earlier meetings, the Institute participants had already reached some consensus on labeling and definition. Questions regarding teacher training were still unanswered, and for this reason, the topic of this Advanced Institute was teacher training.

The primary purpose of the Institute was to upgrade leadership personnel in learning disabilities through the exchange of information regarding the basic issues in pre- and in-service training programs. The Institute participants were divided into seven working committees. The chairmen of working committees were Howard Adelman, James Chalfant, Eugene Ensminger, Jeanne McCarthy, Harold McGrady, Robert Ridgway, and Margaret Scheffelin.

A secondary purpose of the Institute was to upgrade the leadership in learning disabilities through contact with ideas regarding teaching and learning from disciplines other than special education. Two main speakers, Richard Usher, a teacher educator, and Martin Dworkin, a philosopher, were invited to give presentations to the Institute participants.

10. In December, 1971, a Special Study Institute funded under Public Law 91-230 on "Leadership Training Models in Learning Disabilities" was held in New Haven, Connecticut (Minskoff and Lokerson, 1972). The following is taken from a preliminary report of the New Haven Institute:

> The Institute for Advanced Leadership Training, was more specifically and directly related to the delineation of

personnel training needs. The New Haven Institute was planned to extend the content of earlier projects by asking "How can leadership personnel in learning disabilities best be trained?" The New Haven Institute, therefore, provided for professional consideration of ways to train the leadership personnel who would, in turn, train the LD Specialist and other personnel who work directly with learning disabled children. . .

Four basic questions confronting those who train personnel in the area of LD were considered at this Institute:

A. What types of leadership personnel... specifying roles, functions, and competencies...are needed?

B. How should we train these leaders... specifying current and innovative approaches to content and processes... to develop these competencies?

C. How can we marshall and distribute these resources so that the training efforts will effectively meet the manpower needs of all regions?

D. How can these strategies and approaches to the training of leadership personnel best be evaluated?

Broadly stated, the New Haven Institute sought to generate, conceptualize, and suggest implementation steps for the development of leadership training programs and approaches, the marshalling of resources for their operation, and the evaluation of resultant training programs and products. While primarily aimed at the development of leadership personnel in learning disabilities, it was expected that many of the outcomes of the Institute would also be applicable and potentially integrated with other areas of special education, as well as the field of education in general.

As is usual with any working conference, the professional impact which the Institute reported here may have upon the fields of learning disabilities, special education, or general education can only be seen in perspective during the years to come. Certainly, the Institute represents the combined and concerted efforts of over forty professionals related directly to the fields of teacher training and learning disabilities. These efforts generated hundreds of hours of preparation and participation and were conscientiously directed toward a myriad of problems which were of concern to the participants. . .

The final report reflects the wide variety of competencies, approaches, resources, and evaluation steps which are the characteristic products of group efforts. Rather than a single, universally applicable set of guidelines, the content of the Institute might better be considered as a guidance counselors file of possible and worthwhile avenues for the use as a reference by the maturing field of learning disabilities to judicially and prudently select from. From the many broad and specific ideas generated and discussed each professional who has responsibility for decision-making in leadership training programs must tailor a given program to the particular needs which are apparent.

Throughout the Institute, however, there were several common threads or concerns which emerged. These areas showed when they not only appeared independently in different groups, obvious commonality but also recurred continually within each group's discussions. These common threads included:

1. The need for data in the form of both empirical and research information in order to support current teacher training procedures, and to generate and buttress innovative programming.

2. The necessity for utilizing both empirical and research information in order to form a broadly useful and applicable base for determination of programs for personnel training.

3. The readily apparent and often productive interrelationships between the somewhat artifically structure delineation of competencies, approaches, resources, and evaluation, which resulted in both overlapping and duplication among the various groups during all phases of the Institute.

4. The strong agreement among the participants that there was a need for meeting the goals of suggesting and implementing action steps which would result in movement and change within the field, rather than the mere recitation or even re-organization of ideas without resultant or follow-up action.

5. The demand that recommendations for implementation steps should extend beyond a written report to include action by the Leadership Training Institute, professional organizations such as CEC and ACLD, and other appropriate professional forces, such as the U. S. Office of Education. Encouragement was given to professionals to act individually or in groups in order to provide a strong impetus toward these changes.

> Beyond these common threads and concerns, the Institute provided a structure of content and procedure which permitted professionals concerned with the training of leadership personnel in learning disabilities to communicate about issues and problems in terms of both possible and probable ways of resolving, or at least minimizing them. It is hoped that these initial stages will provide the increasingly necessary professional activity which will result in continued growth in productive directions for the field of learning disabilities.

Conclusions on Historical Perspective.

1. While the funded university training programs in learning disabilities had at the least doubled between 1966 and 1969, the total amount of funds allocated remained relatively constant--around the one million dollar figure. The result was that all training programs were forced to operate on a much reduced budget without a reduction in the demands for quality of instruction or the number of personnel to be trained.

2. Numerous definitions of learning disabilities were advanced during the early and mid 1960's (i.e., the Task Forces, the Northwestern definition, the National Advisory Committee) which had different frames of reference (e.g., educational, medical, etc.), but any apparent variations in content were actually variations on the same theme. Basic agreement on what the learning-disability population was and what it was not could be noted in most of these definitions.

3. The rapid growth of interest in this field placed tremendous pressure and demands on existing programs to do far more than the number of faculty or available resources could accomplish.

4. Federally-funded training programs in learning disabilities underwent a rigorous process of evaluation through the mechanism of a yearly program proposal review.

5. By 1969, groups of professionals in the field had collectively developed two sets of program guidelines and principles for personnel training in learning disabilities: (a) Task Force II, Section IV (Haring and Miller, 1969), and (b) the Tucson Report (Kass, 1970).

The epilogue to the Tucson Report included the following about personnel training:

> Currently, the field of learning disabilities has reached a crucial point, both in the synthesis of philosophies basic to learning disability programs, and in the development of teacher standards and qualifications. . . The process of defining minimum standards and qualifications of personnel in learning disabilities has just begun. . . Process involves active change over time, and must include continuous application of old and new knowledge. While the major purpose of the Advanced Institute was to provide a forum for personnel description and training, an interesting side effect was the discovery of the extreme diversity of the participants. Each group worked from its divergence of knowledge toward convergence in its report.

Robert Ridgway, a consultant to the LTI, has reacted to the foregoing historical perspective as one of the leaders of the first group of federally-funded training programs:

> An understanding of history should relieve the scholar from the need to repeat the past. The history of the field of learning disabilities is typical of that of most rapidly developing fields. It is foolish to presume that definitions, program objectives, and current patterns for distributing resources will hold, even in the short run. The student of the field is forced to anticipate further change as attempts are made to bring optimum services to handicapped children. Changes within learning disabilities may occur due to pressures brought to bear from both inside and outside the profession. The population to be served may change because of the influence of reports such as the one prepared by the Seminar of Scholars (see Appendix G); there may be changes in the kinds of preparation programs which are funded under Public Law 91-230, Part G; and changes due to pressures generated by parent groups throughout the United States. A study of the history of the field of learning disabilities should warn the professional to maintain a certain amount of flexibility in his stance.

PROGRAM PRACTICES (1971-72)

The data for this section of the report were collected from the grant proposals of the 38 federally-funded teacher training programs for the academic year 1971-72. Of the following programs, eight were program development grants and 30 were traineeship and fellowship grants:

ARIZONA
    *Arizona State University
    University of Arizona

CALIFORNIA
    University of California, Los Angeles
    University of the Pacific
    University of Southern California

COLORADO
    University of Denver

CONNECTICUT
    Central Connecticut State College
    Southern Connecticut State College
    University of Connecticut

GEORGIA
    Georgia State University

*Program Development Grants

ILLINOIS
- Northwestern Illinois University
- Northern Illinois University
- *Southern Illinois University
- University of Illinois

KANSAS
- University of Kansas

MAINE
- *University of Maine, Farmington
- *University of Maine, Orono

MARYLAND
- *Coppin State College

MASSACHUSETTS
- Boston College
- Boston University

MINNESOTA
- University of Minnesota, Duluth
- University of Minnesota, Minneapolis

MISSOURI
- University of Missouri

NEVADA
- University of Nevada

NEW MEXICO
- *Eastern New Mexico University

NEW YORK
- Teachers College, Columbia University
- Yeshiva University

OHIO
- University of Cincinnati

PENNSYLVANIA
- Pennsylvania State University
- Temple University

TENNESSEE
- George Peabody College for Teachers
- Memphis State University

TEXAS
- *Our Lady of the Lake College

UTAH
- Brigham Young University
- University of Utah

*Program Development Grants

VIRGINIA
University of Virginia

WISCONSIN
University of Wisconson, Milwaukee
*Wisconsin State University, LaCrosse

Information from the 38 programs is summarized under five topic headings: (a) Program Goals, Rationale, and Philosophy, (b) Program Faculty, (c) Program Content, (d) Student Selection Criteria, and (e) Job Market.

Program Goals, Rationale, and Philosophy

The first eleven programs funded in 1966 provided the prototype for the development of new programs for the preparation of personnel. Chalfant, Kass, and Foster (1968) described three levels of graduate training: (a) clinical or remedial teachers at the master's degree level who could interpret test results, do continuous assessment of the classroom situation, and do remedial teaching; (b) supervisory personnel (educational specialists) who have advanced training in diagnosis and remediation, and who could supervise and consult with other teachers; (c) doctoral-level personnel who could function as researchers, teacher trainers and in administrative roles.

The target population, however, was not defined as a specific learning disability population separate from the handicapped until a spate of definitions appeared in 1966 and 1967. The initial programs operated out of the existing legislative definition. The Northwestern definition (Myklebust and Kass, 1969) and the National Advisory Committee definition (1968), both devised in 1967, became the primary source for population definition in program proposals through 1971.

At the turn of the 1970 decade, educational, political, and social events caused special education to examine its present position relative to categorical labels. As a result, the 38 proposals which were reviewed for this report showed an increase in the number of programs which deal with a broader continuum of learning problems. More emphasis was noted in many programs on mild problems and problems previous excluded in learning-disability definitions, such as academic underachievement, behavioral deviations, and slow learners. Fourteen out of the 38 programs specifically mentioned either the Northwestern definition or the National Advisory Committee definition, both of which more precisely define the learning-disability population at the severe problem end of the continuum.

In December, 1971 the LTI invited four consultants (Howard Adelman, Virginia Brown, Doris Johnson, Harold McGrady) to discuss future directions in personnel training. After reading the proposal outlines, these consultants expressed concern about the philosophical and theoretical foundations of the programs. They made the point that they found it difficult to determine the "character" of each program from the words in the description of its goals. In order to more accurately determine the philosophical foundations of these programs, the consultants recommended that questions be prepared which

---

*Program Development Grants

could be incorporated into a questionnaire to be sent to training programs. Specific questions were generated from this meeting which could serve as guidelines for the initiation of programs. The 1969 Tucson Report offers another source of specifics as guidelines for the growth and development of training programs.

For the current report, we have combined the questions generated by the LTI consultants and the Tucson Report into the following guidelines which may be used to determine the rationale and philosophy of programs:

1. *Are the necessary prerequisite factors considered before a program is initiated?* Among these considerations are (a) an awareness of the *need* to train personnel in learning disabilities; (b) institutional commitment; (c) financial resources; (d) physical and educational facilities; (e) adequately trained faculty; (f) potential job market for program graduates (Chalfant, 1970). Any new program may, of course, have all the necessary prerequisities, but the degree to which each consideration is realized will differentiate the quality programs from the "paper" programs.

2. *Are the children who would be the target population different from the normal and other handicapped populations?* Definitional conceptualization of learning disabilities must be the basis of any instructional rationale and philosophy. The broadness or specificity of population definition in turn determines training procedures. The Seminar of Scholars (see Appendix G) recognized the urgent need for an operational definition of the learning-disability population for research purposes. The strategy which they devised for arriving at an operational definition and description of the characteristics of this population can be applied to training as well. It was suggested by the Seminar that the initial population should include *all* children referred as having learning problems or difficulties. Through a series of screening, a more specific subpopulation is derived. A general conclusion by the Seminar was: "The field of learning disabilities acknowledges its responsibility to provide services for children with severe learning problems whether they be learning disability children or others."

3. *Are the roles of learning-disability personnel different from roles fulfilled by other educational personnel?* The LTI conducted a telephone survey of 24 directors of federally-funded training programs in learning disabilities in order to ascertain the present roles of the graduates of these programs. From the information, the following statements are presented: (a) approximately 80% of the personnel with a bachelor's or master's degree have taken positions as resource room teachers. Others are called itinerant teachers, diagnostic-remedial teachers, or teachers in self-contained classrooms; (b) the few graduates with an educational specialist degree will fill positions as coordinators of learning-disability programs in school districts as consultants, or as specialists in the state Child Service Demonstration Programs (CSDP's); (c) about 70% of the doctoral graduates have taken positions on college and university staffs as teacher trainers, while others will act as curriculum supervisors, school psychologists and researchers.

Master's Degree Roles. The entire Advanced Study Institute in Tucson provided a forum for a discussion of the specific roles and functions of teachers of children with learning disabilities and the implications for teacher training. Some of the elements which differentiate between the general classroom teacher and the learning-disability specialist were articulated by Harold McGrady's group: (McGrady, 1970)

> We have said that the teacher in the regular classroom teaches the curriculum. She attempts to follow an outline or sequence within an expected amount of variation. She attempts to impart a certain series of information or skills to her children. Thus, she generally follows the same course for all students. The teacher of children with learning disabilities deals with children who do not succeed in the regular curriculum because of specific learning deficits. (Other conditions are tested elsewhere, and are eliminated by definition; so learning disabilities is not to be considered synonymous with "underachievement.") Thus, the role of the teacher of children with learning disabilities is to teach children with specific learning disabilities. However, this does not mean that the role is a tutor, merely repeating the work done in the classroom, or helping the child with his homework. Except in severe instances it does not mean that the teacher of children with learning disabilities is responsible for the child's entire academic regimen. (This would be true only for the small proportion of learning disabilities children placed in self-contained classes).
>
> Hence, the role of the teacher of children with learning disabilities is not to teach the curriculum, but to teach the child how to learn. In order to do this the teacher of children with learning disabilities must deal with the learning process. (p. 71)

The data from the 38 programs indicate that the role for which most master's level trainees are being prepared is a combined one, including both diagnostic and remediation skills. Some of the newer programs, primarily in the business of preparing teachers for rural areas, have defined a role which is not noticeably different from that of the experienced teacher, especially one who has the basic skills--intuitive or acquired--for individualizing instruction. This graduate would not be expected to have the specialized skills for the clinical role of the diagnostic-remedial teacher; however, both may bear the same job title.

Doctoral Degree Roles. The roles of teacher training, research, and administration are common to all doctoral personnel in education. A doctorate, while providing the opportunity to become an "expert" in a speciality, also affords the professional entree into scholarly circles where one may engage in original thought, theorizing, synthesizing, and debating with colleagues in the same or other fields of study. The person who has a major interest and specialized knowledge in learning disabilities assumes the role of expert in developmental deviations in learning rather than in normal development, although he must understand the latter; just as the person in educational psychology takes on the role of expert in child development rather than in developmental deviations, although he must understand the latter. With the interest in hiring teachers with knowledge about learning disabilities, the role of teacher trainer has become an important one. The role of the researcher in learning disabilities has also become important with the increasing interest in research relating to the various aspects of diagnosis, remediation, educational settings, characteristics of the population, and characteristics of teachers.

At the New Haven Institute the "roles, functions, and competencies" of leadership personnel were discussed. A summary of the discussion made reference to the changing nature of roles and made the suggestion that public schools and training institutions experiment with various role combinations in order to determine the most efficient and effective.

The keynote speech given by Homer C. C. Reed, Jr. (1972), at the New Haven Institute, isolated issues pertinent to advanced training. He stressed two basic points which make the training of leaders for learning disabilities necessary: (a) the observable differences in the training of the personnel according to the degree level pursued, and (b) the realization of the trichotomous nature of education as an empirical, political, and philosophical science. The leaders of education for the learning disabled must be prepared to function according to this nature. Since the purpose of leadership is to accelerate change, it is required that the goals and problems of each factor be known. For instance, a crucial empirical problem is the fractionation of children tentatively identified as learning disabled. Other problems include early identification and specification of treatment procedures. A critical political consideration is the distribution of the leadership talent according to an empirical analysis of needs.

The LTI graduate students at the post-master's level conducted a survey of doctoral students across the country and organized an open meeting for graduate students at the national CEC conference in Washington, D.C. The report of their "task force session" appears in Appendix M. Much of the report concerns role aspirations. The rank order of interests seems to be first, teacher trainer; then, some type of clinical service; and a close third, researcher.

Educational Specialist Degree Roles. With the increase in the federally-funded State Department Child Service Demonstration Programs (CSDP's), there should be a corresponding increase in the demand for personnel who can organize, administer, and supervise direct services to children with learning disabilities in liaison with other special education and with general education, and who can provide in-service workshops. There is need for more supervisory personnel to serve public schools in the field of special education. Such personnel are not prepared for administrative positions after the one-year master's degree program. Similarly, such personnel do not need as extensive training as offered in the doctoral program.

Federal legislation under Public Law 89-10, as amended, in the past several years has allotted funds for special services in public schools. Notable among those titles that have supported special education are Title I, Title III, and Title VI. Title I provides special classes for handicapped children; Title III provides supplementary services (many of these services have tended to be in Learning Disabilities); Title VI provides aid to states. This increase in services has resulted in a major need for administrative and supervisory personnel who could develop and administer these specialized programs.

Baccalaureate Degree Roles. Primarily, the bachelor's degree is designed to prepare an elementary teacher with special skills and additional training to deal with learning problems in the classroom. The person with a bachelor's degree can fill some other roles as well: the one-to-one tutorial situation with prescribed materials, aiding in the preparation of materials, and small group work on a given task. Since the person has a teaching certificate with additional preparation in learning disabilities, he can be expected to have more skills than the paraprofessional in terms of general knowledge about curriculum, group processes, and child development.

4. *Are the training programs for learning disability personnel different from other personnel training programs in education*? In the field of special education today, we are faced with a paradoxical situation. At the same time that education for all children is considered their right and the responsibility of the school, it is also assumed that greater understanding, knowledge, and competencies are required to adequately serve children who do not profit from general education. Further, while we are asking for a better and better generalist, we are at the same time asking for more and more specialized skills.

The roles of personnel in learning disabilities seem to call for specialized competencies. What these competencies are constitute program *content* and how these competencies are to be developed is the training *process*.

The content of leadership training programs can be divided into two major aspects: knowledge and technology. It is very difficult to specify knowledge limited to the field of learning disabilities, except in the realm of specific terminology (jargon) and esoteric classification systems. Those training programs where the entire content is made up of such knowledge are narrow indeed. Knowledge content can be broad in scope, since no one field has a premium on knowledge. Knowledge across disciplines can be acquired and understood by those in any other discipline. Knowledge content in training programs for personnel in learning disabilities ideally will be taken from a wide variety of fields, such as the social sciences, the behavioral sciences, and the physical sciences. Technology, on the other hand, relates more specifically to competencies, roles, and functions. The question of how much technology and knowledge, too, can be taught in a given amount of time (at each level of preparation) remains to be evaluated.

Howard Adelman (1970) has developed a set of general propositions and and long-range goals as guidelines for planning and implementing a model preparation program in a monograph which was written in connection with an ESEA Title VI-B Project. This monograph has been adapted into three articles which will appear in the *Journal of Learning Disabilities.*

Adelman begins with three propositions from which program content is derived:

1. The program should offer a detailed, coordinated, and integrated curriculum involving academic, observational, and participatory experiences through which an individual can proceed in an appropriately patterned and sequenced fashion;

2. The curriculum should be presented in two major phases:

   a. the preservice phase, which encompasses that period of formal preparation prior to being employed and/or adjudged as at least minimally qualified for a particular role and function, and,

   b. the in-service phase, which encompasses all subsequent formal training related to that role and function; and

3. The curriculum should reflect a positive commitment to meeting the needs of the pupil population to be served, the needs (personal and professional) of the participants enrolled in the program, the needs of the field of education (general and special), and the needs of society.

A program's specific content, according to Adelman, is derived from "the accumulated theoretical and practical knowledge regarding: (a) growth and development (with emphasis on the pertinent facets of sensory, perceptual, motoric, linguistic, cognitive, social, and emotional development); (b) learning and performance; (c) motivation; (d) instructional content and process; (e) assessment and research processes; (f) system ecology (...what is known about the importance of and how to interact with and utilize others within as well as outside of the school system); and (g) the growing discipline of education."

The organization of such knowledge for curriculum planning and implementation varies according to goals, rationale, and philosophy of a given program and results in program content which in turn produces competencies. Adelman has presented one organization of curriculum which lists five areas of instruction (assessment, program planning and implementation, consultation, supervision, and research), and three "types" of competencies (behaviors and skills, content and concepts, and awareness and attitudes).

The breadth and depth of course work and practicum experiences, and the extent to which competencies can be attained to minimal level depend upon the length of the program and the definition of competencies. In a mini-paper prepared for the New Haven Institute, Corrine Kass presented a classification system which might be useful for differentiating the knowledge and technology in a learning-disability training program from other fields. This system is based on the taxonomy of educational objectives of Benjamin S. Bloom and is presented for the cognitive domain only, but the affective and psychomotor could be done as well. These suggested objectives appear in Appendix N. It will be noted that the objectives for the master's degree program contain only the first three major classes: 1.00 Knowledge, 2.00 Comprehension, 3.00 Application. Both the educational specialist degree and the doctoral degree levels include the first three in more detail, but show a concentration on the addition of objectives at the higher classes within the cognitive domain. The educational specialist degree level takes the student through classes 4.00 Analysis, 5.00 Synthesis; while the doctoral degree level includes classes 4.00 Analysis and 5.00 Synthesis, with goals different from the education specialist goals, and the additional class 6.00 Evaluation.

The process by which the above knowledge and skills are to be acquired by leadership personnel in learning disabilities will vary widely across the country according to training personnel, facilities, selection criteria of students, types of services to children, definitions of the children to be served, as well as national, state, and local needs for personnel. Inservice training within the public school system is gaining in popularity, state departments are becoming more involved in the process of teacher training, and preservice training in learning disabilities is becoming less and less variable as communication among the teacher trainers increases.

Depending on the level of training required, planning and implementation of training programs must depend a great deal on the scope of the job market. For example, post-master's level graduates will be invited to man training, research, and service programs around the country and will be asked to not only provide leadership roles in the setting to which they go, but will be asked to adjust to the prevailing types of services and attitudes in a given community. Typically, master's level graduates receive a certificate in the state in which they were prepared, and may stay within the state boundaries. Such personnel use their skills within existing public school services. Where learning disabilities programs are being added to the specialized services in the school system, training may take the form of inservice or part-time training.

Conclusions on program goals, rationale, and philosophy. The formation of any program for the purpose of training personnel to work in the education of handicapped children must be based on a sound philosophical foundation. The above guidelines may serve as a framework for program development.

Becker (1963) signaled the direction for quality training programs when he said:

> This conference has made us all painfully aware of the complexity of the problems involved in understanding, detecting preventing, and training children with various kinds of learning disabilities. Knowledge in a wide variety of disciplines (neurology, genetics, physiological psychology, experimental psychology, pediatrics, clinical psychology, education, special education, child development, psychological measurement, etc.) has brought to bear on some of the problems by the various contributors. In view of the wide variety of disciplines which are making relevant contributions to understanding and doing something about learning disabilities in children, it would seem important to consider the development of training programs with a broader interdisciplinary base. At a minimum, most of the gaps in our knowledge cannot be systematically explored without expert training in at least two disciplines.

Robert Ridgway, a consultant to the LTI, made the following statement and recommendations regarding program goals, rationale, and philosophy:

> As more and more information about training programs is communicated by listing instructional objectives in behavioral terms, it will become more difficult to find straightforward statements of program philosophy. It is difficult at the present time to get a clear understanding of the philosophy behind the program. It may be even more difficult in the future. The data reported in this section

point up the problem of labels meaning different things in different programs. Good program development, program description, and program evaluation will depend on the ability of the professional to communicate his own philosophy in terms which minimize confusion for the reader or listener. Following are a few recommendations and comments:

1. If funding patterns are to follow the priorities of BEH or of the field, it will be important to be able to differentiate between programs which propose to train people under a rigorous definition of learning disabilities such as that proposed by the Northwestern Institute or by Task Force III and those which will train around a broader definition.

2. In the light of moves toward criterion-referenced instruction, behavioral objectives, etc., it becomes very important for us to develop ways to compare the breadth and depth of program involvement.

3. Recent developments in the area of teacher certification will make it important to communicate from one institution (by this is meant university to state department, public school, etc.) to another concerning program goals and procedures for meeting those goals. Employers of newly-trained learning-disability teachers have the right to know what kinds of skills are possessed by those they would employ. Communications with future employers deserves attention!

Program Faculty

Area directors of the 38 funded programs (1971-72) can be characterized by the following data: (a) about half have received their training from four universities: Northwestern University, University of Illinois, University of Kansas, and Syracuse University; (b) 90% have received doctoral degrees in the last ten years; (c) all area directors have doctorates if their programs are on traineeship-fellowship funding; (d) program development grants have some master's level people, but are seeking directors with a doctorate; (e) 75% have doctorates in special education, 7% in psychology, and the remainder have combination doctoral degrees; and (f) when areas of specialization were mentioned, the majority were not from learning disabilities--six from mental retardation, five from communication disorders-deaf, and five from learning disabilities.

There is a shortage of personnel to staff learning-disability training programs. Out of the 38 funded programs, approximately half have only one faculty member with full-time commitment to the program in learning disabilities. Some programs have been placed on "warning status" because of insufficient number of faculty members. A large majority of programs listed additional staff members as high priority. To compensate for shortage of faculty trained specifically in learning disabilities, departments have drawn faculty from related area (such as remedial reading, educational psychology, counseling and guidance) to teach learning-disability courses.

In an effort to respond to the need for more leadership personnel, funding priorities have tended toward the postmaster's level. It was necessary, at the same time, to respond to the need for teachers of children with learning disabilities by channeling more of the funds to master's level fellowships and less to the doctoral level than was desirable.

Ridgway has suggested the following recommendations about program faculty:

> 1. Over a period of years high funding priority has been given to the preparation of doctoral people to participate in training programs, and to the preparation of sufficient master's level people to provide for good practicum sites. As the number of funded programs has expanded--and funding has not--the field has been unable to respond to the continued demand for doctoral level personnel.
>
> 2. Another recommendation is to stress practical experience with children with learning disabilities in the training of doctoral-level people. I would also suggest stressing the possibility of college or university teaching experience as a part of a doctoral program. These two recommendations are made with the knowledge that seventy percent of our current doctoral production finds its way into college or university teaching roles.
>
> 3. Another area worth considerable thought is that of the schools which intend to start producing people at the specialist level. These people would probably be working either in large cities or in state departments in supervisory roles and administrative roles. Appropriate staff for programs such as these might be a little bit different than the faculty for either the master's level or the doctorate level of programs. It could include people with experience working in intermediate units or in a state department and certainly should have some program components and practicum components that are different than those that are currently found in learning disabilities programs.

Program Content

What constitutes a professional training program is only partially answered by formulating goals and procuring qualified faculty. The means to the goals can be said to be as varied as the possiblities within the program situation. The type and amount of program content are functions of a number of variables and correlates: the availability of financial support, of physical and educational resources, of university commitment to the program, of course offerings both in the specialized area of study and in related areas, of appropriate practicum settings, of the characteristics of the faculty, of the characteristics of the students in the program, of the number of faculty in the program area, of the institution's requirements, of the goals of the students, of the theoretical orientation of the faculty, of the definition of the target population, of the students' background of experiences, of the faculty's background of experiences...

Such variability is not always obvious in the program proposals. While course content, course descriptions, and course titles are generally similar, the variability results from the specific orientation of the teacher trainer and departmental direction or focus.

Adelman (1970) proposes that model program content should include the following strands: (a) training in "assessment, remediation, and research," (b) practicum participation in "public school classrooms and clinical settings," and (c) community experiences by way of "contact with a variety of learning problem children and their families."

Master's Level Content. Within the 38 funded programs (1971-72) there is general agreement about the levels of proficiency to which personnel should be trained. Core content typically includes a two-course sequence in learning disabilities, psychoeducational diagnosis, methods of remediation, and practicum experiences which include both clinic and school practice. The two-course sequence typically involves a survey course and a course in advanced readings in learning disabilities.

The importance of the practicum within the learning-disability teacher training program was expressed by Robert Ridgway (1970) in the Tucson report as follows:

> The heart of the program of preparation is the practicum. Opportunity to interact with children with learning disorders is invaluable, and must be provided both in clinical settings and in public school situations. Differences in opinion exist about the proper sequencing of theory and practice and about the relationship between practicums in remediation and in diagnosis. The predominant view can be outlined as follows:
>
> 1. Theory should be learned concurrently with practicums.
>
> 2. Directed observation is the most efficient way to learn how to watch children.
>
> 3. Remedial work is more easily learned, so initial practicum experience should be in this area (working with children previously evaluated by more advanced students).
>
> 4. Diagnosis and analysis can be included in practicum experience during the second semester of the graduate student's first year.
>
> 5. Advanced practicum experience should include tutorial, itinerant and LD classroom work with children.
>
> 6. The advanced student who is going to become an educational manager must develop proficiency in the systematic analysis of instructional materials.
>
> 7. Persons at the paraprofessional level could be trained to remediate only certain types of LD problems or to evaluate only certain areas of behavior.

Further similarities in the programs are found in the related areas of speech and language, and reading. Very few programs (only six) refer to a requirement in child development. It may be that this field of study is actually taught under courses in language development or in the core courses in learning disabilities; or it may be assumed to be part of the student's undergraduate background.

Only one-third of the programs require a course in statistics or tests and measurements separate from the core courses in diagnostic procedures or an individual intelligence testing course. Unique qualities in some programs are reflected in specific courses with titles such as "Medical Problems in Learning Disabilities," "Visual Skills, " "Educational Problems in Sensation and Perception," "Developmental Semantics and Syntax." While a few course titles are unique, there is,however, a generally-observed similarity of program content. This similarity is evidenced by the program proposals and may be due to the funding guidelines, the interchange of proposals among program coordinators, and the panel review process.

Doctoral Level Content. Of the 38 federally-funded programs (1971-72) twelve universities have doctoral programs. These twelve are listed below:

University of Arizona
University of California, Los Angeles
University of Southern California
Georgia State University
Northwestern University
George Peabody University
University of Illinois, Urbana
University of Kansas
University of Minnesota, Minneapolis
Teachers College, Columbia University
Temple University
University of Virginia

The doctoral programs in learning disabilities are designed for training personnel for leadership roles in administration, college teaching, and research. The majority of the programs indicate considerable individualization. One program does not even present a course sequence because choices are so varied.

An examination of funded doctoral programs manifests both universality and uniqueness. Universality is reflected in program goals and course offerings and uniqueness is denoted by program emphasis and specialization.

The commonly shared program goal is the preparation of teacher trainers. The training of research personnel and leaders for learning-disability programs at the local levels has emphasis in some programs.

The course work of the funded doctoral programs is similar in the course offerings from the fields of special education, learning disabilities, and statistics and research design. While different programs place differing degrees of emphasis on these fields, course offerings from these fields are found in all the programs. Each program also includes practicum experiences, seminars and internships.

The practicum experiences include the development of diagnostic and remedial skills, supervision of clinical work, inservice teaching, college teaching, supervision and administration of learning-disability programs at the state and local level, participation in faculty research studies, individual research, interdisciplinary investigations, and participation in colloquiums. Several programs indicate that practicum experiences are tailored to the student's individual needs.

Other fields of study that are often found in doctoral programs include psychology and foundations of education. It appears that the greater the number of offerings in psychology the greater is the theoretical emphasis of the doctoral program. It could also be inferred that emphasis on psychology reflects the doctoral level program's direction toward dealing with severe learning-disability problems.

Uniqueness of funded programs is indicated by program emphasis and specialization. Different programs are marked by (a) a theoretical orientation, (b) stress being placed on the communication disorders, (c) emphasis on interpersonal dynamics, (d) the preparation of state leaders, (e) the formation of research personnel, (f) the training of psychoeducational diagnosticians, (g) the consideration of learning disabilities as an umbrella for mildly handicapped and (h) emphasis on severe, specific learning disabilities.

The newness of leadership training in learning disabilities has caused some of the programs to incorporate master level courses in doctoral programs to guarantee a sound background in the area of learning disabilities for the doctoral student. While the future may see a reduction of master's level courses in doctoral programs because most doctoral students will have a basic core program from their master's level work, the value of diversity which results from a variety of student backgrounds should not be ignored.

The Advanced Study Institute in Connecticut (1971) addressed itself primarily to leadership training. The keynote speech given by Dr. Homer Reed isolated issues pertinent to advanced training. Reed asked the question, "How are these leaders to be trained and distributed?" He suggested that it would be best to start by selecting the most gifted minds and exposing them to public school and political environments as well as to the university environment.

While institutional degree requirements and core content in the above-mentioned programs are relatively rigid, doctoral programs, as a rule, do allow for individual modifications. Julian Stanley of the Laboratory of Experimental Design (LED) in the School of Education at the University of Wisconsin was quoted by Homer Reed in his Connecticut speech as saying:

> The key to LED's success has not been courses primarily, however, but instead the high intellectual and academic quality of its 'inputs' and the heterogeneity of their background.

At this stage of knowledge in this field, it may be somewhat premature to attempt a statement regarding what body of knowledge constitutes program content at the doctoral level in a specialization called learning disabilities. Over time a more precise body of knowledge specific to this field may evolve.

Educational Specialist Level (or sixth year) Content. Six universities (1971-72) have programs leading to a degree beyond the master's, which is distinct from the first year of a doctoral program. The six universitites are listed below:

University of Arizona
Southern Connecticut State College
University of Illinois, Urbana
Boston University
University of Minnesota, Minneapolis
University of Virginia

The six funded sixth-year training programs evidence a great deal of commonality. The purpose of the programs are similar, the nature of the practicums and internships reflect the common purposes, and the course work is from a restricted number of fields of study.

The purpose of the sixth-year programs is the training of learning-disability personnel for administrative and supervisory roles. This is accomplished in the following ways: (a) evaluative diagnostic and remedial skills are extended beyond the Master's level, (b) internships involve master's students' practicum and administration and organization of learning-disability programs at state and local levels, and (c) experience in conducting inservice training programs.

All of the funded sixth-year programs include courses in special education, especially supervision and administration of special education and learning disabilities. Courses in statistics and psychology are also frequently included in sixth-year programs.

The degree given for a sixth-year training program has been given a variety of labels but the term educational specialist is most commonly used. Other terms are Advanced Certificate and Certificate of Advanced Graduate Study. While the degree has a variety of names, there is a considerable agreement about the purpose of sixth-year degree. This degree is not to be construed as the same as the first year of a doctoral program.

Undergraduate Level. Seven colleges and universities have developed, or are in the process of developing, undergraduate programs in learning disabilities. These are:

University of Denver
Southern Connecticut State College
Southern Illinois University
University of Minnesota, Duluth
University of Nevada, Las Vegas
Brigham Young University
University of Maine, Farmington

Most of the undergraduate programs are in the developmental stage. Two approaches to program content seem to be emerging: (a) courses and experiences in learning disabilities are added to the pre-service program in elementary education as a type of minor for the purpose of preparing the regular classroom teacher to deal with learning disabilities in the classroom; and (b) courses and experiences in learning disabilities are presented at the undergraduate level as prerequisites for a master's degree program. Only one or two programs seemed to indicate that graduates of their program would be qualified as a special teacher in learning disabilities.

Recommendations on program content. Robert Ridgway has suggested the following recommendations about program content:

1. A study should be made of the variables and correlates listed in the first paragraph of this section. Such a study might determine which variables and correlates have real bearing on program

quality. It should be manageable because of the relatively small numbers of funded programs, and it might be possible to extrapolate any information gathered to other areas of training.

2. The field should examine the role of the paraprofessional in learning disabilities. If it is found that paraprofessionals are actually used in the way suggested by Ridgway's group at the Tucson Institute, then paraprofessional training models could be developed and information could be shared with other institutions.

3. An examination should be made of the learning-disability component in the new funding applications. This could help determine whether it is a function of schools following the formal of successful proposals from other institutions.

4. A study could be made of some of the programs which have unique course requirements to see what particular kinds of objectives the program leaders have set for themselves and what impact these courses have had on the students and on the way students behave once they're on the job.

5. More input from State Departments and public schools should be solicited for further development of specialized programs. In general, these programs are not as yet well defined and input from the field could be valuable.

6. The depth and breadth of the master's degree level training program is directed to the development of diagnostic-remedial teachers. State programs and local school programs might hire educational specialists with training beyond the master's degree to supervise and administer learning-disability programs.

7. Systemmatic research studies in various universities should be conducted to determine the efficacy of the program content which has evolved from the beginning of the funding.

Student Selection Criteria

Student selection criteria has not been one of the primary topics of discussion at any of the major conferences or institutes on training. There were more important considerations in the early years of planning just in relation to program development. The surge of interest in this field seemed to have provided enough of a pool of applicants for the number of students a program could handle.

The point has been made in previous sections of this paper that the quality of graduates of a degree program is a function of many factors; for example, faculty, program content, etc. However, it is questionable whether competent professionals can be trained if the trainees who are admitted to a program are not chosen via realistic and discriminating standards of admission.

A review of the 38 programs (1971-72) reveals that the means of selection for most degree programs is based on some or all of the following types of criteria: (1) performance on an aptitude/achievement battery (e.g., Graduate Record Examination, Miller Analogies Test), (2) past academic achievement as measured by grade point average, (3) past teaching and/or clinical experiences, (4) letters of recommendation, and (5) personal interview.

The crucial question to be asked at this time is, are these criteria sufficient to select the best students for learning-disability programs? The above criteria may or may not be useful, depending upon cut-off points, the reliability of the information, the ability of an admissions group to read between the lines on measures which tend to be positive in nature such as letters of recommendation, and to match student and program appropriately. Since the issues of program content, population definition, etc., are still in a developmental state, it is unlikely that specific selection criteria can be defined precisely at this time. The characteristics which distinguish a quality professional from an incompetent one have not been clearly defined.

Doctoral level selection is a special case requiring additional considerations. Specific criteria may relate directly to a given program with a type of orientation (e.g., (1) teacher training, research, or administration, (2) language, theoretical, or behavioral), but natural selection can also operate in the sense that students will tend to gravitate toward programs which promise to fulfill their goals. Homer Reed, in his introductory remarks to the Advanced Study Institute in New Haven, Connecticut, questioned the purpose of a meeting to discuss doctoral level characteristics in selection and training:

> . . .I am not aware of institutes to study problems related to leadership training in physics, or in chemistry, or in botany, or in psychology. And I've begun to wonder what is there that is so very special about Special Education, that we had to have what appears to me to be a rather artificial way of approaching the entire problem of development of leadership personnel. In other fields, we normally count on the emergence of leadership personnel through a process of natural selection.

Recommendations on Student Selection

1. Better descriptions of the quality of programs will probably give us a better handle on the quality of students who are selected. High quality faculty and high quality programming will undoubtedly attract high quality students. Efforts should be made to improve the quality of faculty personnel.

2. Recruitment procedures ought to include opportunities for seeking out the students who would be the best candidates for any given program. High school and undergraduate recruitment might be an avenue to explore. In addition, experimentation with selection of students from a variety of backgrounds (not only from education) should be tried.

3. Built-in choice points within a student's program may serve to protect both the student and the advisor from having to make the best of a bad bargain. There could be a probationary period of time, or it could be understood that transfer would be possible at these choice-points without loss of face.

4. A factor which should be considered in the admission of a student to a degree program in learning disabilities is the student's degree of commitment and dedication to the field.

Job Market

Selection criteria are closely tied to the job market. The current situation of an over-supply of teachers in general education probably bears a relationship to the increase in number of applicants to learning-disability teacher training programs. It is now possible to upgrade selection criteria to a degree which would enhance excellence of prospective teachers and leaders in the field. With the open job market in learning disabilities, many applicants gravitate toward this field without necessarily being aware of what the job entails or having an interest in or commitment to working with the handicapped child.

The LTI Telephone Survey of the directors of the 38 federally-funded training programs in learning disabilities revealed that the job market for degree personnel (all levels) is extremely favorable. A shortage of jobs was noted only in some of the larger metropolitan areas, such as New York City and Los Angeles. In more areas of the country, especially in rural areas, the demand for personnel trained in learning disabilities exceeds the supply; only a few areas report an equilibrium between the demand and supply. Most program directors predict that this job situation will remain the same for the next three to five years, and that the need for learning-disability personnel will markedly increase in some areas if legislation is passed or funds for special services become available.

Recommendations on Job Market

Because of expanding program needs (e.g., the establishment of CSDP's) the job market looks favorable for personnel with training in administration, supervision, and consultation competencies. The Educational Specialist degree level should afford a ready supply of such personnel. The recommendation is made that more federal funding be allocated to programs at that level.

Inservice Training

Inservice training is beginning to play a fairly prominent role in learning disabilities. The inservice training of regular teachers to be sensitive to the needs of learning-disability children has received emphasis. Trippe (1971) has made the following statement about this general issue in special education.

> For a strategy whereby special education training might benefit regular teachers, much has been made of the body of knowledge--the skills and the technology--that could improve the performance of regular teachers with handicapped children. My preference would be to underplay this aspect of special education but to emphasize the values and attitudes toward children that characterize the field. Special education is tuned in to individual differences, to relating to children as individuals, and to believe in the fundamental worth of each child. (p. 37)

One of the working groups at the Tucson Institute discussed the issue of inservice training. Jeanne McCarthy (1970) summarized her group discussion as follows:

The role of the public schools in the preparation of teachers appears to be a keen issue, with much emphasis being placed on a cooperative arrangement between the universities and the public schools. A sub-issue, but related to responsibility for training, is that of which agency should and will shape the role of the learning disability-teacher; state departments of education, university training programs or public schools.

Lack of data is reflected in this section of the report because the survey of program practices in the 38 federally-funded programs does not yield data on inservice practices. Only a few indications will be noted in this section.

Inservice training is an activity which is stressed through funding to the State Education Agencies. Approximately six million dollars is awarded through Public Law 91-230, Part D, to the 50 states and 6 territories to assist in the training of personnel for the education of handicapped children. A major thrust in these inservice activities is in the area of learning disabilities in the form of workshops, special study institues, summer training programs and fellowship support.

Some examples of model inservice training programs are the following:

1. In the St. Louis metropolitan area, the Miriam Community Education Program is directed by Eleanore Kenney, a consultant to the LTI. The goals of the program are to identify preschool handicapped children, to plan and carry out an educational program to help handicapped preschool children, to counsel parents with regard to special needs of such handicapped children, and to make use of community resources which are available for diagnosis and educational planning for handicapped children. To implement these goals, the Miriam School offers inservice training for the community's preschool personnel. Training is provided through large meetings, informal small discussion-type meetings, in-depth workshops, and consultation services.

2. Another type of inservice concept is that of minicourses. The Far West Laboratory in Berkeley, California, has developed minicourses which include such titles as "Developing children's oral language," "Individualizing instruction in mathematics," "Organizing independent training-Primary level," and "Higher cognitive questioning." Such training provides one specific topic per session thus allowing the teacher to attain a measurable skill, rather than merely providing general lectures or workshops on "learning disabilities." The State Department of Education in Florida is also developing "Mini Paks" for the inservice education of teachers.

3. An inservice program designed by Adelman and Feshbach (1971) utilized pairs of teacher-consultants who go from classroom to classroom to train teachers. This program involves demonstrations and discussion, practice, initial implementation with support and follow-up support. Because competencies are stressed, the time used in working with teachers varies according to the individual needs of the teachers.

Conclusions and Recommendations on Inservice Training

Not all inservice projects are designed with the same concern for concentrated training. Some follow another direction which is that of the brief overview. This has been the case where professionals are called upon by school districts to give a three-hour to a three-day inservice workshop on such vague and unwieldy topics as "learning disabilities" or "learning problems in the regular classroom." It is questionable how much value can be derived from such short sessions on such wide topics. If such training sessions are used as the basis of "mass certification" of those in attendance, the ethics as well as efficacy comes into question. The limitations of training personnel via this inservice route should be recognized. The question which might be asked is "Does a brief overview in short inservice sessions actually increase the teacher's understanding or merely promote confused reactions?"

The inservice issue deserves broader treatment by concerned leaders. The following suggestions are made to this end.

1. An advanced study institute should be designed and held for the purpose of combining ideas from leaders in this area for the purpose of determining the extent and the quality of inservice programs.

2. The IMC/RMC Network could be called upon for necessary information on the latest media, methods, and materials. The Special Education Instructional Materials Centers/Regional Media Centers (IMC/RMC) Network (Erickson, 1970) provides consultation, conferences, and inservice training through "modern methods, media and materials." The CEC Information Center on Exceptional Children has related that it is able to aid in preservice and inservice training activities with feedback and follow-up in the field through its affiliation with the Network.

3. An issue which should not be ignored is the role and training of paraprofessionals as a State Education Agency function as well as a development within institutions of higher education.

TEACHER CERTIFICATION

Certification guidelines are the licensing requirements of the teaching profession. The primary purpose of any licensing procedure is to insure that services rendered in the name of a certain profession will be done by adequately trained and qualified individuals. McGrady and Atchison (1971) have stated:

> Any profession that can truly regard itself as a profession must have an adequate and appropriate set of standards for its members to meet. This may be the one characteristic that makes an occupation qualify as a profession--the establishment and maintenance of standards of conduct, ethics, and qualifications for competence.

In order for any type of licensing procedure to be effective in regulating the quality of service given by a profession, the following elements must be present:

1. The guidelines must be comprised of realistic requirements, the fulfillment of which is not so difficult as to greatly limit the number of trained individuals entering the profession, but stringent enough to insure the quality of training of those who meet the requirements.

2. The requirements must be accepted and supported by the members of the profession as adequate and essential standards to maintain the quality and integrity of the field.

3. The profession and/or the licensing agency must have the power to enforce the regulations and to insure the adherence of its members and potential members to the certification requirements.

4. The license or certificate must be of marketable value to the recipient. A license to practice in a certain profession has meaning to the holder if it will put him at a decided advantage over another individuals in the field without the license. The advantage must come in terms of job offers and acceptance by other licensed members, among other things.

Current Status of Teacher Certification in Learning Disabilities

The State and Province Committee of the CEC Division for Children with Learning Disabilities addressed itself to the question of certification during 1971-72. Information was sent to the Committee chairman, Corrine E. Kass, and was presented in tabular form to the Committee at its meeting in Washington D.C., March, 1972. This paper will present the information in more depth, incorporating the data sent to the LTI by State Departments of Education.

The summarized data which follows reflects the status of teacher certification as of July, 1972. It is expected, however, that minor alterations will need to be made over time since many states are in the process of changing existing guidelines. Nevertheless, certain generalizations and trends can be noted.

From an analysis of the data, the following general statements can be made:

1. Twenty-nine states have certification in learning disabilities; 21 states do not have certification in learning disabilities.

2. In states which do not have specific teacher certification in learning disabilities, learning-disability children are taught by teachers with certification in such areas as special education (nine states), educable mentally retarded (four states), physically handicapped (two states), and remedial reading.

3. The basic degree required for specific learning disability certification varies from state to state. Eight states require a BA in Special Education with emphasis in learning disabilities, although two of these states will grant only one to three-year provisional certificates to a teacher with this degree. Seven states require a Master's degree for permanent certification.

Six states require only provisional certificates. Three of these states require the teacher to be actively engaged in the pursuit of permanent certification (for example, six graduate hours per year). Eleven states require dual certification. Teachers must have elementary, secondary, or special education certification in addition to certification in learning disabilities.

4. There is considerable variation in university course work requirements from state to state. Sixteen states require 3-10 semester hours in specific learning disabilities courses, seven states require 11-20 hours, and two states require 21 or more hours. Several states also require a specific number of semester hours in other special education courses. Ten states require 3-10 hours in this area, two states require 11-20 hours, and three states require 21 hours or more. Practicum courses provide variable credit--eight states require 3-10 semester hours, one state requires 11-20 hours, and two states require 30 hours or more.

5. The amount of successful teaching experience required as a prerequisite for certification varies from none to five years. Three states require no previous teaching experience (either with normal or exceptional children), three states require one year of previous teaching experience, two states require two years of teaching experience, three states require three years previous teaching experience, and one state requires five years previous teaching experience (this requirement is for a supervisor-consultant position in learning disabilities).

6. In five of the states without certification in specific learning disabilities, the competency of a teacher for a learning disability position is judged entirely by the employing school district.

7. In five of the states which do not have certification in specific learning disabilities, Commissions have been established by the respective state departments to "look into" the area of learning disabilities and the possibilities and alternatives for state action in this area.

8. Two states indicated that, due to the great shortage of learning-disability teachers, they prefer to hire a "highly trained and proven teacher" in a related area rather than one with a minimum of training in learning disabilities.

The most obvious conclusion which can be drawn from these data is the great variation of certification guidelines and requirements for learning-disability teachers. Over half of the 29 states which have learning-disability certification require only three to ten hours of course work in learning disabilities. In eight of the states, only three to ten course hours of practicum experience with learning disabled children is required.

Some examples of variations in requirements is evidenced in such situations as the following: (a) one state has the title of "Learning disabled specialist" for a teacher of learning-disability children, but no certification guidelines or requirements in LD, (b) another state allows a regularly certified teacher to teach in the field of learning disabilities if he has a three-hour course in learning disabilities (the content or requirements of this course are unspecified), (c) one state held a four-week summer workshop to qualify 80 regular classroom teachers as resource room learning-disability teachers, (d) another state requires a master's degree in learning disabilities, three years teaching experience, and 30 hours of supervised practicum experience in order to qualify as a learning-disability teacher.

In 1969, a survey by Schwartz reported that 11 of the 45 responding states offered learning-disability certification. She found "that the majority of departments of education responding classify teachers of children with learning disabilities under some other heading..." (p.35)

In a survey conducted in 1970, McGrady and Atchison (1971) reported that only 22 states offered learning-disability certification as compared with 29 states in 1972. However, the basic characteristics of certification guidelines and requirements today coincides quite closely with their conclusions:

> These (certification requirements), represent a spectrum, largely influenced by a variety of notions about what the field of learning disabilities really is. . . .it can be seen from an overall view of certification for LD in the U.S. that it is patch work.

Robert L. Minniear, a doctoral candidate at Northeast Louisiana University, is collecting data for a dissertation tentatively entitled, An Evaluation of the Criteria used in Establishing Teacher Training Programs at a Select Group of Colleges and Universities in the United States under the direction of Dr. Majorie Synder. Mr. Minniear has provided the LTI with a preliminary review of certification data and a list of learning-disability training programs for each state. This review appears in Appendix O.

Factors Accounting for the above Status

The ideal situation would be one in which all those engaged in the education of learning-disability children would hold a certificate which would truly represent sufficient training and necessary prerequisite experiences, which, in turn, would result in quality instruction. Obviously, this ideal type of certification does not exist in the majority of states today. The reasons for the existing less-than-ideal conditions are complex, interwoven, and some times difficult to determine. In the discussion which follows, an attempt will be made to isolate some of the key issues and factors accounting for the present status of teacher certification in learning disabilities. Only through isolation and discussion of such factors can future courses of action for the improvement of certification policies be determined.

As a means of looking at some of these factors, the following discussion will focus on the major forces which have direct or indirect effect on the quality of certified personnel in the field. The agents which have been identified as having an influence on the quality of certification of learning-disability teachers are (a) the general public, especially parents of children with learning disabilities, (b) the State Department of Education, (c) the teacher education institutions, (d) the public school, and (e) professional organizations. Although these forces will be treated separately, it is recognized that their actions and functions are highly interrelated. The CEC

Committee on Professional Standards for Personnel in the Education of Exceptional Children (1966) spoke of the relationship among agencies involved in determining certification standards:

> An interrelated responsibility for certification exists among colleges and universities, professional organizations, and state education agencies. Professional organizations should generate, revise, and publish standards for consideration by state certifying agencies with a recognition of the necessity for adaptation to local needs. The close cooperation and support of the teacher preparation institutions, preferably in the form of advisory committees which would meet with the representatives of state education agencies, is also a procedure which should be utilized. . . . it is important that a close liaison be effected among all of these groups.

1. General Public and Parents. The role of the general public and, in particular, the parents of children with learning disabilities, was a major one in the development of the field of learning disabilities. The parents were initially responsible for directing legislative support at both the federal and state level. The parent lobby for legislative action was based on the argument that there was a large proportion of the school population (three to 20 percent) not being served adequately because funds to support special teachers and classes were not available. Once legislative action was taken, parents continued to press their demands on school districts to form classes immediately. In some cases, these demands could be met immediately and satisfactorily *if* a properly trained teacher were available. In many instances, however, there was a shortage of adequately-trained personnel and in reaction to external pressures, state departments of education hastily adopted certification requirements which met the state *minimum* standards and thus made it possible for teachers with a *label* of "learning-disability teacher" or "learning-disability specialist" to be quickly produced.

2. The State Department of Education. The CEC Committee on Professional Standards for Personnel in the Education of Exceptional Children has stated the role of the state in teacher certification:

> The legal responsibility for certification of teachers for positions in the public schools with any state rests with the state education agency.

While a state department has the power to establish the guidelines for certification requirements, they must do so in light of the definition and guidelines established by legislative action.

Although legal responsibility for granting certification is retained by the state, often university or college personnel are asked to recommend the criteria for certification. Some colleges and universities set standards considerably above state minimums for certification. This is particularly true when certification accompanies or is contingent upon a degree (either B.S. or M.A.). Most states require a certificate applicant to have a recommendation from the parent college or university and this gives the teacher education institution an additional handle or lever on the certification level.

Because the state departments of education have the power to interpret and act on applications for certification, the degree of flexibility or rigid adherence to the established certification guidelines will ultimately affect the type of certified person entering the field.

3. Teacher Training Institutions: At present, the university remains the institution primarily responsible for training learning-disability personnel. First, a university can exert influence on the certification of qualified personnel. Second, universities can screen applicants to degree programs in learning disabilities and admit only those who exhibit the potential to become highly competent teachers. Third, universities can do much to regulate the type of graduate who goes into the teaching profession. The competency of a graduate is largely a function of the type and quality of the program in which he was trained. This is even more likely if the admission standards were initially high.

Universities are presently operating under some rather severe limitations in terms of learning-disability training programs: (a) there are several states which do not have training programs in learning disabilities, (b) there is a shortage of personnel to staff university learning-disability training programs resulting in over-extension of existing faculty in number of courses taught, students advised, and practicums supervised, and (c) budgets are being trimmed in many university programs.

4. The Public School: The school system can be very influential in the certification of qualified professionals by adding the "meaning" to the training and certificate. A certificate from an approved program should be more marketable than a certificate which was gained through less-than-strict adherence to the guidelines. Today there is a trend in school districts to hire a teacher with the least amount of training and experience because he is at a lower level on the salary schedule.*

Another frequently followed school district policy which tends to detract from the significance of qualify certification is to give short-term workshops in learning disabilities to selected individual within the school district. Upon completion of such a workshop the school district gives the teacher a new label (such as "learning-disability specialist") and in short order a learning-disability program is created in the school. The relatively open job market in learning disabilities has been attractive to teachers with another type of certificate who would like to try a new field. Since, in some states the requirements to become a learning-disability teacher were minimal and easy to fulfill in a relatively short period of time, there has been a migration of teachers into the field of learning disabilities whether or not they are committed and skilled in this area.

Like universities, public schools also operate under certain limitations which hinder program effectiveness: (a) rising costs and expenses which may partially explain why cheaper teachers are sometimes hired, and (b) a shortage of supervisory personnel.

---

* Gresham's Economic Law states that bad money drives good money out of circulation. A corollary to this law in education might be that less experienced and less trained teachers drive more highly trained and more highly experienced teachers out of jobs.

5. Professional Organizations: To this point, none of the major professional organizations is directly involved in establishing certification standards for learning-disability personnel. CEC has "no plans to become a certifying agency," but it notes the potential role of standards which are developed by a professional organization:

> Professional standards developed by a professional organization may become a point of reference for state certification. Since professional organizations tend to set standards above minimum state education agency requirements, these organizationa may provide the impetus to raise standards in the various areas of exceptionality.
>
> Certification is a function of the state department of education and the needs and circumstances of each state is unique. Therefore, the role of national organizations should be that of setting minimum standards and qualifications.

Recommendations on Teacher Certification

CEC has been reluctant to involve itself as a certifying agency, but more leadership could be provided in the establishment of minimum standards and qualifications. The degree to which a profession chooses to police its own ranks will largely determine the quality of professionals who join the ranks in the future.

A workable alternative for certification procedures has been established by the speech and hearing profession. The American Speech and Hearing Association (ASHA, 1971), a professional organization, has developed a list of requirements for a certificate of clinical competence which specifies such things as: (a) The number of supervised clinical hours needed for certification, (b) The number of courses needed as well as the types of courses needed for certification, (c) The type of internship experiences needed for certification, (d) The guidelines for areas to be covered on a national written examination, and (e) The competence of supervisors of clinical experiences.

Definite advantages have accrued to those who have earned ASHA certification in marketability of their skills, reciprocity of the certification, and acceptance of the certificate by others in the professional ranks.

Another alternative to professional quality has been formulated by the International Reading Association (1970). This association has established responsibilities and training requirements for different reading specialist roles. National certification is not the purpose of the IRA requirements, rather they are guidelines for a planned program leading to the master's degree and beyond from an accredited institution. Course work and practicums are stipulated for the training of a special teacher in reading, a reading clinician, a reading consultant, and a reading supervisor. The International Reading Association's guidelines are an example of a professional association establishing minimum requirements for the practice of that profession.

A set of standards established by a professional organization could contain the basic skills and competencies as listed in the Tucson report. National guidelines could be flexible enough to allow individual states to adapt these standards to any particular need or situation within their state.

PROGRAM ASSISTANCE GRANTS (1972-73)

The funding for learning-disability training programs has continued to come out of the dollars appropriated under Public Law 85-926, as amended by PL 91-230, Title VI, Education of the Handicapped Act, Part D, which does not include learning disabilities in the definition of handicapped children.

As of October, 1971, the Program Administrative Manual (1971) from the Division of Training Programs, Bureau of Education for the Handicapped, revealed a change of direction in the funding of training programs. This manual states:

> Programs of manpower preparation must produce more personnel with known, specific competencies and must contribute to differentiated systems of instruction in order to provide for those handicapped children not now receiving adequate instruction and to progress toward quality education for all handicapped. Thus, the emphasis in manpower programs should be on competency domains and instructional goals, not upon child labels.

This revised approach is mirrored in a document coming out of the Special Education Training Program, Bureau of Educational Personnel Development (BEPD), USOE (Reynolds and Davis, 1971), in which the following statement appears:

> Training programs for teachers and other special education personnel should be made specific to instructional systems rather than to categories of children. . .
>
> State and local regulations and procedures for special education should be centered on special programs and the people who conduct them, rather than on categories of children. School systems should be given special financial aids to open several alternative systems for the teaching of reading, for example, rather than for the identifying of learning disabled children. Leadership personnel in special education should center their efforts on improvement of programs, rather than on regulating the boundaries of the categories of children.
>
> Special education should shift major attention to ways of inserting itself back into main-stream educational structures. . .

The LTI, in telephone conversations with 24 directors of federally-funded training programs in learning disabilities, inquired as to the implications of these program changes through the Program Assistance Grants. The program directors indicated some divergence in reaction and prediction. Among the more common reactions were the following:

1. This type of funding may result in more flexibility within special education departments by giving the departments control over where financial support would be directed.

2. This type of funding may result in more cross-category exchange of knowledge.

3. This type of funding which was established to deemphasize labels may, in fact, merely encourage the emergence of a new set of labels and categories.

The implications of this type of funding by the Bureau of Education for the Handicapped are difficult to accurately define at this time. However, preliminary indications may be noted in the following issues which are presently under discussion in the field:

1. How do we locate learning-disability training programs under the new Program Assistance Grants? A comparative study should be made of the effects of training personnel for a generic population in contrast with the effects of training personnel for a specific population of handicapped children.

2. What effect will the removal of labels have on existing training programs? Is it possible or practical to train a generalist across all school problems in light of the advances in knowledge about developmental deviations? Is it possible, perhaps, to train personnel across two or three of the current categories? If so, which combination?

3. What are the characteristics of practicum settings appropriate to training programs funded under the new Program Assistance Grants? Will appropriate practicum settings be available?

4. What is the relationship of inservice training to the existing training programs? Does inservice training result in the same caliber teacher as the program which involves the student in full-time study under a federal fellowship grant? Where and when can meaningful practicum experiences be developed for inservice training programs?

CONCLUDING STATEMENT

This report is based on the state of the art in training programs of learning-disability personnel as indicated by leaders in the field of learning disabilities who are operating federally-funded programs, and the guidelines of the USOE. This statement is presented as a perspective from which to view the current state of personnel training practices. The birth and growing pangs of an evolving field have been noted and as the process of maturation continues, graduates of training programs will determine the validity of existing programs.

REFERENCES

Adelman, H. *Teacher education and the educationally handicapped: Some basic issues and partial answers*. Project No. S-006-0000-768-002, California State Department of Education, Division of Special Education, 1970.

_________, and Feshbach, S. An experimental program of inservice teacher education in disadvantaged area schools. *Education*, Fall, 1971.

American Speech and Hearing Association. *Requirements for the certificate of clinical competence*. Washington, D.C., 1971.

Arena, J. I. (Ed.). *Management of the child with learning disabilities: An interdisciplinary challenge*. *Selected Papers on Learning Disabilities, Fourth Annual International Conference of the Association for Children with Learning Disabilities, 1967*. San Rafael, California: Academic Therapy Publications, 1969.

Becker, W. C. Summary of the conference. In Kirk, S. A. and Becker, W. C. (Eds.) *Conference on children with minimal brain impairment*. Urbana: Easter Seal Research Foundation, 1963, 131.

Chalfant, J. C. Group report. In Kass, C. (Ed.). *Final report: Advanced institute for leadership personnel in learning disabilities*. Contract No. OEG-09-121013-3021-031, U. S. Office of Education, Department of Special Education of the University of Arizona. Tucson, Arizona: The University of Arizona, 1970, 36-37.

_________, Kass, C. E., and Foster, G. E. Training specialists for children with learning disabilities. In Hellmuth, J. (Ed.) *Learning disorders*, Vol 3. Seattle, Washington: Special Child Publications, 1968, 539-550.

_________, and Scheffelin, M. A. *Central processing dysfunctions in children: A review of research*. Washington, D.C.: U. S. Government Printing Office, 1969.

Clements, S. D. *Minimal brain dysfunction in children*. Public Health Service Publications, No. 1415. Washington, D.C.: U. S. Department of Health, Education, and Welfare, 1966.

Erickson, D. K. *The CEC information center: Progress and potential*. Arlington, Virginia: The CEC Information Center on Exceptional Children, 1970.

_________. *Network resources for teachers of the handicapped*. (Adapted from a presentation by P. J. Newberg at the 94th Annual Meeting of the American Association on Mental Deficienty, 1970.) Arlington, Virginia: Special Education Network, 1970.

Fudell, S. *The handicapped children project of the Southern Regional Education Board, Atlanta, Georgia*. Grant No. 32-20-7180-1017. Washington, D.C.: Office of Education, U.S. Department of Health, Education, and Welfare, 1967.

Haring, N. G., Reid, W. R., and Beaber, J. D. Professional preparation for the education of children with learning disabilities. In Haring, N. G. and Miller, C. A. (Eds.) *Minimal brain dysfunction in children.* Public Health Service Publication, No. 2015. Washington, D.C.: U. S. Government Printing Office, 1969.

_______, and Miller, C. A. (Eds.). *Minimal brain dysfunction in children.* Public Health Service Publication, No. 2015, Washington, D.C.: U. S. Government Printing Office, 1969.

International Reading Association. *Roles, responsibilities, and qualifications of reading specialists.* Newark, Delaware, 1970.

Kass, C. E. (Ed.). *Final report: Advanced institute for leadership personnel in learning disabilities.* Contract No. OEG-09-121013-3021-031, U. S. Office of Education, Department of Special Education of the University of Arizona. Tucson, Arizona: The University of Arizona, 1970.

_______, and Myklebust, H. R. Learning disability: An educational definition. *Journal of Learning Disabilities*, 1969, *2*, 377-379.

McCarthy, J. M. Group report. In Kass, C. E. (Ed.) *Final report: Advanced institute for leadership personnel in learning disabilities.* Contract No. OEG-09-121013-3021-031, U. S. Office of Education, Department of Special Education of the University of Arizona. Tucson, Arizona: The University of Arizona, 1970, 50.

McGrady, H. Group report. In Kass, C. E. (Ed.). *Final report: Advanced institute for leadership personnel in learning disabilities.* Contract No. OEG-09-121013-3021-031, U. S. Office of Education, Department of Special Education of the University of Arizona. Tucson, Arizona: The University of Arizona, 1970, 71.

_______ and Atchison, M. Teacher certification in learning disabilities. In Arena, J. I. (Ed.) *The child with learning disabilities: His right to learn. Selected Papers on Learning Disabilities, Eighth Annual Conference of the Association for Children with Learning Disabilities, 1971.* San Rafael, California: Academic Therapy Publications, 1971.

Minskoff, J. G., and Lokerson, J. *Preliminary report: Institute for advanced leadership training.* U. S. Office of Education, Department of Special Education of the Southern Connecticut State College. New Haven, Connecticut: In press.

Professional standards for personnel in the education of exceptional children. Professional Standards Project Report. Washington, D. C.: Council for Exceptional Children, National Education Association, 1966.

Program administrative manual: Preparation of personnel in the education of the handicapped. A Manual for Use by Institutions of Higher Education and State Educational Agencies in Applying for and Administering Grants under P. L. 91-230, Part D and Part G. Washington, D. C.: U. S. Department of Health, Education, and Welfare, 1971.

Reed, Jr., H. B. C. Keynote speech. A special study institute. New Haven, Connecticut, 1972. (mimeographed).

Reynolds, M. C., and Davis, M. D. (Eds.). Exceptional children in regular classrooms. Minneapolis, Minn.: Department of Audio-Visual Extension, University of Minnesota, 1971.

Ridgway, R. Group report. In Kass, C. E. (Ed.). Final report: Advanced institute for leadership personnel in learning disabilities. Contract No. OEG-09-121013-3021-031, U. S. Office of Education, Department of Special Education of the University of Arizona. Tucson, Arizona: The University of Arizona, 1970, p. 78.

Schwartz, L. L. Survey of certification requirements for teachers of children with learning disabilities. Association for Children with Learning Disabilities Legislative Committee Report, March, 1969. Sixth International Convention, Association for Children with Learning Disabilities, Fort Worth, Texas.

Special education for handicapped children. The First Annual Report of the National Advisory Committee on Handicapped Children. Washington, D.C.: Office of Education, U. S. Department of Health, Education, and Welfare, 1968.

Trippe, M. J. See the cat? See the cradle. In Reynolds, M. C. and Davis, M. D. (Eds.) Exceptional children in regular classrooms. Minneapolis, Minn.: Department of Audio-Visual Extension, University of Minnesota, 1971.

METHODS AND MATERIALS
IN LEARNING DISABILITIES

Corrine E. Kass

with

Rena Lewis

James DeRuiter

Marsha Schubert

Ernest Archambault

August 1972

INTRODUCTION

For all types of deviations it is possible to find some suggested remedy, from the over-the-back-fence variety to professional prescriptions. The notion of individualized instruction which has developed in general education has a special connotation when it comes to dealing with the idiosyncratic deficits of the handicapped child. The farther the deviations are from the normal, the more adaptations must be made in methods and materials. The familiar question of both teachers and parents, "What do we do with this child?," must be answered with specifics such as techniques for management of behavior, selection of skills to be taught, methods for teaching these skills, and selection of appropriate materials.

A basic purpose of special education has been stated as that of providing therapeutic-instructional benefit for exceptional children. (Kelly, 1971) There are many examples of attempts to provide the appropriate therapeutic situation within the history of the field of learning disabilities. In the 1930's and 40's, several books appeared on the market dealing specifically with remedial procedures for "brain injured" children and for disorders in reading, writing, spelling, and arithmetic. (Monroe, 1932; Gillingham and Stillman, 1936; Orton, 1937; Fernald, 1943; Hildreth, 1947; Strauss and Lehtinen, 1947). Since that time, many treatments have been designed and published for a population of children which has variously been given the labels "minimal brain dysfunction," "interjacent child," "learning disabilities," "perceptually handicapped," etc.

During the next two decades, a small group of pioneers developed specific treatments based on a background of knowledge and perception about deviations in learning (Kephart, 1960; Cruickshank, 1961; Myklebust, 1963; Frostig, 1964; and Kirk, 1966). Each of these individuals contributed a basic school of thought on the underlying factors purported to have a relationship to successful learning experiences.

Because public school services for learning-disability children were not readily available until the late 1960's, private institutions and private agencies provided an important arena for devising remedial materials and treatments (Delacato, 1959; Getman, 1961; Barsch, 1965). It is understandable that desperate parents would look to these institutions for a service which was denied them in the public schools. It was during this time that learning disabilities (minimal brain dysfunction) was touted as a condition peculiar to the middle and upper classes, since these were the only ones able to pay the exorbitant fees for services.

Some of the existing experimental treatments came to be considered "panaceas." In many cases, a single sophisticated experimental treatment was adopted without adequate validation. In the zeal to disseminate information about these treatments, both lay and professional groups began to use terms regarding the mysterious central processes (such as visual perception and auditory perception) superficially.

A parent's group, the national Association for Children with Learning Disabilities (ACLD), was organized in 1963. This organization has played a primary role in publicizing the existence of a learning-disability handicap and the need for public school services.

At about the same time that the national parents' group was forming, several agencies of the U. S. Department of Health, Education and Welfare, and the National Easter Seal Society for Crippled Children and Adults became interested in the problems of the children who exhibited deficiencies in mental processes (other than overall intelligence) which interfered with educational achievement. Three task forces were assembled for the purposes of studying terminology (Clements, 1966), educational and medical services (Haring and Miller, 1969), and research (Chalfant & Sheffelin, 1969).

The report of Task Force II (Haring, 1969) stated about classroom management: "Management is characterized by an endless variety of materials, methods, and recommendations for changes in instructional materials. Evaluation of the effectiveness of these methods is carried out largely by the impressions of teachers from gross observations."

Rogan and Lukens (1969) in the Task Force II monograph, Section III, reported the results of a survey of existing instructional services in public schools and the operational framework for service programs. The latter information relates to methods and materials for children with learning disabilities. One section of the survey was directed toward actual practices and procedures in the special classroom and/or other teaching services. The responses from teachers revealed that the following curriculum areas are included in special programs as a major part of the curriculum: (1) 77% reported developing or improving skills in reading, spelling, writing, grammar, and arithmetic, (2) 56% mentioned fine visuo-motor skills, (3) 52% reported oral communication skills, (4) 37% indicated gross motor development, (5) 34% reported social skills, and (6) 15% referred to content areas.

Rogan and Lukens posed the following questions for consideration in planning curriculum:

> Is the curriculum for young children overweighted in certain directions, e.g., providing experiences and developing language, or would a good developmental curriculum provide more opportunities for developing gross motor, visual-perceptual and grapho-motor skills? Would such a curriculum serve to stimulate development in these areas in children with marginal problems without the need for individualized evaluation and special teaching except for severe cases?

They concluded that

> To an unprecedented degree in education, the planning for children with learning disabilities is a multidisciplinary effort both from the standpoint of diagnosis and class assignment, as well as therapeutics. The professional specialties of psychology, medicine, speech and language therapy, social work, physical education and/or physical and occupational therapy supplement the work of the specialist in education. In his capacity as administrator the educator serves as coordinator of the information and services of other disciplines. The teacher functions as the central figure responsible for the child's learning, not only through specific educational programing but also in implementing the recommendations of other specialists. . .

> The involvement of a large staff of ancillary personnel from within the school faculty or on a volunteer or training basis from outside the school is common in order to provide the many therapies required. This appears to reflect the multifaceted nature of the syndrome of minimal cerebral dysfunction as the therapies range over any of the systems--motor, perceptual, cognitive, language, social, and emotional--which may be involved.
>
> Classroom procedures reflect recognition of the uniqueness of individual learning patterns as seen in the teachers' practice of individual instruction. Environmental modifications and special curriculum adjustments were reported by the majority. There appears to be greater awareness and perhaps understanding of various areas of child development and deficits, with an orientation toward remediation, rather than simple reduction of standards or reteaching at a slower pace.

From the mid-1960's to the present, public school services have increased in number to meet legislative requirements at both the state and federal levels. The need for personnel burgeoned along with the increase in services. Since the university training programs could not prepare a sufficient number of teachers, many states provided for short workshops, and in-service training programs; many universities provided summer training programs. Because of the time element, such training sessions have by necessity been extremely practical in nature. Coincidently with the increase in services and teacher training programs, a number of texts on methods in learning disabilities appeared on the market. (Johnson and Myklebust, 1967; McCarthy and McCarthy, 1969; Rappaport, 1969; Myers and Hammill, 1969; Siegel, 1969; Lerner, 1971, Slingerland, 1971; and Kirk and Kirk, 1971).

Accompanying the increase of knowledge in the field was a corresponding increase in published materials. It soon became evident that mechanisms were needed to organize and disseminate the current information about handicapped children. In 1962 the President's Panel on Mental Retardation recommended that a network of instructional materials centers be established.

Experimental Instructional Materials Centers demonstrated usefulness and in 1966 the network for Special Education Instructional Materials Centers (SEIMC's) were officially made operational by BEH funding and the CEC Educational Resources Information Center (ERIC). In 1969, this network joined with the parallel Regional Media Centers (RMC's) for the deaf to form the Special Education IMC/RMC Network. The purposes of the Network are described in the following statement from an overview given in a Network communication (Erickson, 1970) sent to IMC/RMC directors and BEH personnel:

> A uniqueness of this project lies both in the establishment of individual centers and in the concept of a national network of diverse but cooperating units. Each unit (1) examines various educational needs of handicapped children; (2) employs effective modern methods, media, and materials to meet these needs through consultation

> services, conferences, in-service training, the development and loan of media and materials, and by providing mobile library units; and (3) then disseminates its findings throughout the Network. The results are then implemented in the classroom, where they effect change in the learning process.
>
> To more fully implement the major purpose of the SEIMC's/RMC's, the regional centers have devoted increasing attention to establish a cooperating relationship with state departments of education. The intent is to facilitate the development of intra-state associate center networks within their particular region and to serve as a resource to these associate special education instructional materials centers (ASEIMC's). Regional centers are presently shifting their responsibility of providing direct services to teachers over to their associate centers who are much closer in geographic proximity to the users of media and materials.

The CEC Information Center on Exceptional Children (Erickson, 1970) through its affiliation with the SEIMC's related that it would be able "to go beyond the traditional dissemination of information" and that this affiliation "aids in the diffusion of more effective educational practice through pre-service and in-service training activities, regular follow-up with practitioners and constant feedback on the needs of the field."

Demands from teachers and administrators have helped to augment the supply of methods and materials. Publishing companies have responded to these demands, resulting in a great variety of materials for learning-disability children. The question which needs to be asked at this point is whether the methods and materials in learning disabilities have been carefully and scrupulously directed toward this population of children or rather only to the need which the teachers have verbalized.

Two approaches can be taken in answering the above question: one, a philosophical discussion; and two, empirical investigations. This paper will present both approaches in the following pages.

PHILOSOPHICAL DISCUSSION OF METHODS AND MATERIALS IN LEARNING DISABILITIES

"What is special about special education?" was the title of a pamphlet (edited by Darrel J. Mase) which contained a series of Exceptional Children articles in the early 1950's. In this pamphlet, the following statement is made by F. E. Lord:

> In order that the education of the handicapped might have recognition and status there has been a tendency to overemphasize the ways in which it differs from regular education. Fundamentally, special education techniques are the result of the application of the principles of adaptation of instruction and services to the individual needs of pupils. This principle is basic in all education but when applied

> to the handicapped and the gifted results in some marked differences in (1) teaching techniques, (2) curriculum adjustments, and (3) special therapeutic services. . .
>
> Successful teachers of exceptional children are obligated to employ a clinical approach to the study of children. Such children present learning difficulties, sensory and motor impairments which require careful study in order to adapt instruction successfully. Furthermore, teachers of exceptional children are called upon to integrate professional information from psychology, education, and medicine into working hypotheses for instruction and therapeutic services. Consequently, special education as applied to each type of exceptional child has developed some rather distinctive techniques and materials which distinguish it from regular education. . . (pp. 3-4).

The question which is the concern of this survey and analysis of the field of learning disabilities in 1972 is "Is there a need for special education for children with learning disabilities?" The answer to this question can come only from experiential or observational data and depends upon the interpretation which is placed on the data.

It seems logical, however, to suggest that special methods and materials may be necessary on the basis of the observation that children with severe deviations in learning cannot profit from the total curriculum in general education. There is, of course, no definite proof that special materials are necessary and only some evidence that special techniques must be applied, but that there are some children with whom the usual methods do not work seems to be universally accepted. Some therapeutic intervention in the acquisition of academic and social skills is considered necessary for some children, and teachers are being required more and more to provide such intervention. The teacher who is specially trained in such techniques seems to be in demand at the present time. Even in the face of unanswered issues, such as definition of the handicap, etiological factors, and professional roles, specialized methods are being propounded in professional circles and labeled materials are being sold in the marketplace.

Having established, at least philosophically, the assumption that the traditional curriculum does not meet the needs of the child with learning disabilities, the question becomes "How is the traditional curriculum adapted to meet the child's needs?" It seems logical to look at the child and see how he deviates from the normal child who is succeeding in traditional education. However, there does not seem to be an isomorphic, computer-like relationship between the recognized deviations and the educational treatment. There is no perfect "cookbook."

In spite of the limitations in universal knowledge about learning deviations, a number of specialists have been able to relate child characteristics and methods. The development of their work is closely tied to the history of the field as a whole. Early work with brain-injured adults was one source of information which indicated the possible direct relationship between brain functioning and the difficulties which some children were experiencing in school. A few early pioneers, such as Strauss, Lehtinen, Kephart, and Orton began with a professional interest in the education of brain-injured children. Disillusionment soon set in with the concept of brain injury, but specialized methods continued to be used in private schools and institutions. Inappropriate educational treatment in the public schools prompted parental demand for services in the schools, which in turn led to the need for train personnel,

Early treatment approaches had major focus on the areas of handicap in body and spatial awareness, attention, and perception. "Special" programs were developed in these areas, thus giving the teacher a distinct speciality. As direct and indirect support for the field of learning disabilities grew, a vareity of treatment approaches became popular. Problems appeared, such as the overpopularization of some limited treatment approaches, disagreements over which treatments were best for which children, some personnel who are not as skilled and trained as thought desirable, and the excessive or inappropriate use of some published materials of undemonstrated effectiveness.

The philosophical basis to the question "How do we teach the child with learning disabilities and what do we teach him?" must take genesis from an analysis of the subject variables. Such an analysis does not provide a pat answer because there is no proven treatment-of-choice and content-of-choice for each child with Syndrome X. And no one method or material is applicable to all children with learning disabilities. There appear to be several clusters of symptoms or variables, each cluster with an underlying "cause," and these clusters themselves are confounded by each individual's variables, such as age, past school achievement, attitude, etc. It may be that the mediation between subject variables on one hand and methods and materials on the other is accomplished by the teacher. The mechanism which allows the teacher to match the two is the teacher's philosophical conception of the curriculum for learning-disability children.

Study of teachers' philosophical concepts must perforce be put off until a methodology can be designed which would be appropriate to such a complex study. In the meantime, it is possible to study teachers' choices of methods and materials, and what influences their choices. The LTI conducted some surveys which will be reported in the next section of this paper.

EMPIRICAL INVESTIGATIONS

The first investigation was a survey of the textbooks in learning disabilities which have reviewed traditional treatments and which describe the theoretical foundations of such treatments. The second investigation was a survey of publishing companies, in which the companies were asked to specify what materials, if any, were applicable to learning disabilities. The third investigation was a survey of DCLD membership asking them to complete the following statements: (a) "Some of the materials and techniques I use most in remediation are. . ." (b) "Some of the ways in which I use the above materials and techniques are. . ." and (c) "Typical problems for which I use the above materials and techniques are. . ."

Selected Traditional Treatments

The purpose of this section is to briefly review selected traditional treatments for learning-disability children. The treatments which were selected for inclusion are those which are considered to be representative of the most universally-accepted theories in the literature on learning disabilities. An outline of the treatments was devised as a backdrop for determining what teachers learn from textbooks and courses by way of theoretical foundations for the various approaches. The similarities and differences among treatments are noted in the following topic arrangement which provides the system for the description of four types of representative treatments: (a) clinical-theoretical, (b) behavioral-theoretical, (c) academic, and (d) medical. Since more comprehensive reviews are available in textbooks (e.g., Edgington and Clements 1967; Johnson and Myklebust, 1967; McCarthy and McCarthy, 1969; Myers and Hammill, 1969; Lerner, 1971; Kirk, 1972, 2nd edition), the current report will provide only a selected bibliography for each selected treatment. The topic bibliography is given in Appendix P. The bibliographic selections are limited to only those comprising the essence of the treatment and supplementary information.

1. Clinical-Theoretical Treatments. The clinical-theoretical orientation assumes inherent psychological dysfunctions which must be treated before academic therapy begins. This type separates into three distinct approaches to dealing with the psychological dysfunctions of learning-disability children.

a. The first approach, neurology-based treatments, attempts to alleviate the characteristic symptoms observed in the conditions variously labeled "brain injury", "minimal brain dysfunction", "perceptual handicap". Among the authors of this approach are Orton (1937), Strauss and Lehtinen (1947), and Cruickshank (1961).

(1) Orton was concerned with the establishment of hemispheric dominance in the brain for children with language disorders. Educationally, the treatment provides a very systematic way of teaching such children to read, especially those children who reverse letters, words, etc. The approach to treatment in reading disability (or "strephosymbolia", as Orton called it) was "an attempt to capitalize on their auditory competence by teaching them the phonetic equivalents of the printed letters and the process of blending sequences of such equivalents so that they might produce for themselves the spoken form of the word from its graphic counterpart." The approach to writing problems was to change handedness in the "natural sinistral," which, according to Orton, was the primary reason for writing difficulties. The proper position of paper and hand had to be taught. Speech problems were corrected through training in phonetic synthesis--in Orton's words, "we have undertaken to teach the child orally the separate phonetic units and to purify or correct such as he produced improperly or in confusion and then to proceed through simple blending to short words, at the same time building a visual association of the word with an object of the environment or with a picture to fix its meaning." (p. 185)

(2) Strauss, like Orton, worked from a background of knowledge and experience in brain-injury. Strauss and Kephart (1955) developed the concept of certain disturbances in brain functioning (distractibility, perceptual disturbances, thinking disorders, and behavior disorders) in what came to be known as the "Strauss syndrome" and more recently, the "hyperactive" child. Strauss and Lehtinen (1947) developed educational procedures of a remedial nature in which teachers function as therapists who prescribe the remediation and adapt the environment to the needs of their students. The environment should have a minimum of visual stimulation. The pupil-teacher ratio is one-to-one or small group instruction. The materials are teacher-and pupil-made. The remediation

includes major focus on a synthetic phonetic approach to reading, the use of concrete materials in the teaching of math, and cursive writing.

(3) Cruickshank tested the treatment procedures of Strauss and Lehtinen in a public school setting, with a major adaptation in the organization of the environment. A structured program was provided by isolation booths in order to reduce environmental space, and stimulus value was enhanced through the use of color and sound. The program of instruction was designed to "include work that will develop finer muscular control, eye-hand coordination, form perception, and perception of figure-background relationships; it must help in establishing left-right progression and integration of behavior responses. This is a therapeutic program and as such cannot be justified if the child is allowed to keep on doing only the things he is able to do. One must lead him through the things he cannot do--step by step up the developmental ladder." (p. 146)

Form perception was considered basic to arithmetic and concrete materials were used for teaching arithmetic. As in the Strauss and Lehtinen approach, cursive writing was taught. The approach to reading was one in which all other factors in the program of instruction are considered subordinate to reading. Discrimination between a square and triangle (or form perception) is taught in this approach before the distinction between two alphabet letters. Similarly, ear training is suggested before phonics is initiated. In beginning reading, one vowel sound with several consonant sounds is the basis for building words into "word families." Oral reading was stressed.

b. The second approach, readiness treatments, attempts to go back in development in order to fill in prerequisite learning which has not occurred. The absence of this prerequisite learning is posited as the cause of the learning disability. Among the advocates of this approach are Kephart (1960, 2nd Edition), and Frostig (1968).

(1) Kephart's theory assumes that all learning has a sensorimotor base. Beginning with innate responses to the environment, the developmental stages continue through perceptual-motor match, figure-ground relationships, movement control including a feedback mechanism, systematic exploration, perception, intersensory integration, and concept. Roach and Kephart (1966) designed the Purdue Perceptual-Motor Survey to measure the earliest developmental stage. The approach to educational treatment is to restore the course of development in order to alleviate the achievement lag. Customary teaching techniques for an earlier stage than is reasonable for a child's age do not work for the child with learning disabilities. Kephart writes "We must work backward so that, using his present processing, the child can piece together what went before and weld it into a solid, permanent structure." According to Kephart, "The crux of the problems is to teach development--to help the child achieve a developmental task rather than presenting him with facts to be learned." (p. 45). Multisensory stimulation (MSS) is suggested for producing sensory integration. The remedial program utilizes walking boards, balance boards, trampolines, "angels-in-the-snow", games, stunts, rhythm activities, gross motor activities, fine motor activities, perceptual-motor matching tasks, ocular control training exercises, chalkboard training, and form perception training before symbolic materials (letters and numbers) are taught.

(2) The Frostig approach begins with the "developmental concept as a cornerstone of diagnostic and teaching procedures." The specific need

of the child to which a remedial approach is geared is defined as "a discrepancy between the child's actual level of performance in any aspect of development and the optimum level which he could achieve in this area." The educational program is based on test results in four developmental phases: sensory-motor, language, perceptual, and higher cognitive processes. The Frostig Developmental Test of Visual Perception was designed to measure five visual perceptual functions: eye-motor coordination, figure-ground perception, perception of constancy of shape, perception of position in space, and perception of spatial relationships. An important diagnostic finding justifying this emphasis is difficulty on the part of many children with learning disabilities to make the step from the perceptual phase in development to the higher cognitive functions. Worksheet materials were designed as a preventive remedial perceptual training program (Frostig and Horne, 1964).

Overall, the Frostig approach is more than just the visual perception program. She suggests that "an adaptation of the usual educational procedures must be made for children with learning disturbances who have difficulties in attention, planning, memory, and sequential learning. These global difficulties can be conceptualized in developmental terms in the same way as the specific ones. . ." (p. 255). While Dr. Frostig uses general principles of teaching, she suggests that teaching techniques usually differ for the child with learning disabilities. For example, success must be supplied as a motivating factor; learning sets must be externally provided; accurate feedback must be supplied frequently; step-by-step procedures should be followed for disturbances in attention, memory, and comprehension; and developmental phases and academic skills must be presented in the classroom in an integrated fashion. All of the above techniques also benefit the child's improvement in emotional and social adjustment.

c. The third approach, language treatments, attempts to ameliorate all dysfunctions relating to communication: oral, the language arts, and channel inputs. Among the advocates of this approach are Johnson and Myklebust (1967), and Kirk and Kirk (1971).

(1) The emphasis in the Johnson and Myklebust approach to remediation is on the functions (or malfunctions) of the psychoneurological systems. Integrities are as important to study as deficits. Remedial techniques for disorders in verbal language (expressive, receptive, and inner language), in non-verbal language (time, space, size, direction, social-and self-perception), and in arithmetic are provided in the Johnson and Myklebust textbook. The clinical teaching approach requires that the teacher understand the total "syndrome" of the child--intelligence level, home background, emotional status, the nature of the problem in learning, the deficits, the integrities, the levels of function in spoken, read, and written language, the nonverbal, and the medical aspects--in order to apply educational procedures "with precision and accuracy." Evaluation of the effectiveness of remedial work is stressed with the suggestion that application of objective measures and observations be repeatedly made.

(2) The Kirk approach views the child with learning disabilities as having disorders of one or more of the following types: academic, nonsymbolic, and symbolic. The most common academic disabilities are reading, writing, and arithmetic. Nonsymbolic disabilities are perceptual and expressive in nature. Symbolic or linguistic disabilities occur in the reception or

expression of ideas. Intraindividual discrepancies are emphasized in diagnosis which leads to organizing a remediation program.

Kirk, McCarthy, and Kirk (1968) revised an experimental edition of the Illinois Test of Psycholinguistic Abilities (ITPA) which was constructed as a battery of psychological and communication functions (Kirk and McCarthy, 1961). The three dimensions of the ITPA model are (a) channels of communication, (b) psycholinguistic processes of reception, association, and expression, and (c) levels of organization--representational and automatic-sequential.

Basic principles for sound teaching practices are suggested by Kirk and Kirk (1971) for the remediation of deficiencies "which obstruct the acquisition of information and the development of skills and proficiencies." The basic principles are given as the following: "showing success at every step in the teaching process, using minimal steps of increasing difficulty, providing for appropriate reinforcement, avoiding overloading, and retroactive and proactive inhibition." The sequence in remediation is stressed, beginning with the prerequisite deficits first. Other remediation guidelines include training the deficient areas.

The Kirk and Kirk book gives specific guidelines for remediation in each of the functions measured by the ITPA, utilizing areas of strength, using multisensory presentation appropriately, making provisions for feedback, developing abilities functionally, starting remedial programs early, and individualizing instruction. The N-of-One, or idiographic, methodology has been advocated by Kirk (1966) as a springboard for generalizing systematic observations in a single case to other cases.

2. Behavioral-theoretical treatments. The behavioral-theoretical remediation approach assumes that the most important aspect of the teaching-learning situation is the actual behavior of the child in that situation. Treatment is aimed directly at arranging the contingencies of the situation in such a way that the behavior of the child is changed and academic therapy can be applied. Behavior modification which has been utilized as a major approach in many special services and teacher training programs and precision teaching are outgrowths of the practical application of the theoretical principles derived from operant conditioning.

a. Behavior modification. When a child fails to attain some criterion of performance, this failure may reflect difficulties in communication between the teacher and the child rather than an inherent process deficit (Estes, 1970). Principles of reinforcement, response measurement, and cueing can be applied which will allow appropriate responses to occur and inappropriate responses to be extinguished. The treatment, as applied to special education, deals with the "acceleration" of complex processes of the three R's as well as the more familiar "deceleration" of undesired behaviors as talk-outs, tantrums, and out-of-seats. As in the clinical-theoretical treatments, the individualized nature of assessment and correction is stressed in behavioral-theoretical treatments. Lovitt (1970) describes the distinctive nature of a behavior modifier in contrast to clinicians of other methodologies in the words

> Certainly, other disagreements exist between behavior modifiers and clinicians of other methodologies, as well as among behavior modifiers. Generally, however,

> the behavior modifier (a) is committed to individual diagnosis, treatment, and analysis; (b) is concerned with observable events and the direct measurement of their occurrence; (c) obtains several measures of a designated behavior before arriving at a decision or adjusting the environment; and (d) if change is warranted, manipulates systematically some aspect of the environment in order to reliably evaluate the effects of that variable.(p. 90)

b. Precision teaching. More recently, precision teaching has become the identifying badge in the discipline of education for the application of operant principles. For an organized view of the field of learning disabilities from this viewpoint, see Dr. Haring's presentation at the Seminar of Scholars (Appendix G). Alper and White (1971) give a general overview of the use of precision teaching as a tool for school psychologists and teachers:

> The precision teaching language emphasizes precise description of behaviors and events which are directly observable and countable, thus greatly reducing connotative confusion. The format of the precision teaching language also guides the teacher or psychologist in identifying those events in the environment which have the highest probability of effecting the behavior. (p. 446)

Three phases are included in precision teaching: (a) the before phase: pinpointing the behavior and its environment, (b) the during phase: intervention, and (c) the after phase: termination of intervention. The criteria which must be met are (a) the behavior must be directly observable in order that description may be accurate and reliable; (b) the behavior should involve movement; and (c) the behavior should be cyclical, meaning the behavior may be repeated. The identified behavior is called the Movement Cycle. Examples are: verbalizations (sentences or phrases) during quiet reading time, or questions answered incorrectly. The rate for each movement is computed and recorded through all phases of intervention. Aspects of the environment to be altered in treatment are taken from an analysis of the environmental events which have the greatest influence on the behavior of a child at the exact time of analysis. The results of intervention are also analyzed and reported as the Consequence.

3. Academic Treatments. The academic approach focuses on the academic tasks and processes as well as the environmental situations which precipitate school failure. Remedial methods treat the school subjects directly and are based on analysis of errors within the school task. Classic examples of such treatments are to be found in the works of Monroe (1932), Fernald (1943), and Gillingham-Stillman (1956).

a. Monroe studied a large number of reading difficulties under the Behavior Research Fund at the Institute for Juvenile Research, University of Chicago. In preparation for planning remedial instruction for a child, the following data were collected: (a) the educational profile and reading index; (b) the profile of errors, (c) tests of various discriminations involved in reading; and (d) the social, physical, psychological, and psychiatric data which had bearing on the child's reading problem and which were obtained from the clinical record. (p. 111)

Methods were selected "which require an overt motor response on the part of the child whenever possible. . ." (p. 112). The motor response provides secondary links which must be mechanically effected in the child with disability, but which are automatically learned by the child with no impediments to the acquisition of reading.

Monroe's system of profiling errors in reading has spawned within the field of learning disabilities similar methods of analyzing academic skills. Some of the errors for which she presented methods of remedial instruction were excessive consonant errors, faulty vowel sounds, addition of sounds, omission of sounds, repetition of words, and reversals.

b. Fernald, whose kinesthetic method has been widely used even though it is not a "program" took her rationale from the aim of clinical psychology which is "the development of diagnostic, remedial, and preventive techniques that will result in a satisfactory adjustment of the individual to his environment. This may be accomplished (1) by the simplification of the environment to which the individual must adjust, together with the proper training of the individual for this less complex environment, (2) by developing satisfactory adjustments to the requirements of an ordinary environment, or (3) by the development of preventive techniques the use of which will avert failure." (p. 1) The assumption underlying the work of Grace Fernald was that disability in any basic school subject is "wholly preventable" if appropriate educational methods were intelligently applied according to the singular characteristics of the child. The clinic school setting in which Fernald had success with reading, spelling, and arithmetic cases has been maintained to the present at UCLA and continues to accept remedial cases from the classroom.

The initial approach to the child with school problems was called "reconditioning," a method in which all stimuli creating negative reactions were eliminated and stimuli which created positive emotion were substituted. From the positive reaction, reconditioning to the school task was effected. Successful learning on the child's first day was considered more important than sympathizing with the child or talking over his problems. In her book, Fernald (1943) presents remedial methods for school subjects in a system which stresses writing from memory, or the kinesthetic sense, as the key notion.

c. Gillingham and Stillman (1956) wrote a book on academic remediation in reading, spelling, and penmanship. This method, which is known as the Alphabetic System is based on Orton's theoretical position. It was designed for children in third through sixth grades with normal intelligence who were unable to learn to read and spell by the usual school methods. The intensive program utilizes a multisensory approach wherein the child learns both the name of the letter and its sound. After a certain number of letters and their related sounds are learned, these sounds are blended into words.

An adaptation of this method appears in a book by Slingerland (1971). Instruction begins with single alphabet letters (using manuscript), then proceeds to one-syllable phonetic short-vowel words, and finally, to polysyllabic words. The teacher demonstrates the lesson and then individual children respond in front of the class. The teacher aims at preventing errors and gives such guidance as necessary so that failure may be prevented. The testing phase, during which the child works without help, is the last of the structured steps.

4. *Medical treatments.* The medical approach deals with the physical and emotional concomitants which may be amenable to medical or pharmacological therapy. Two types of treatments have been used with learning-disability populations: (a) *drug therapy* attempts to alleviate behavioral symptoms which are thought to obstruct the learning process, and (b) *psychotherapy* attempts to alleviate emotional symptoms which are thought to obstruct the learning process. Not a great deal will be reviewed in this report on medical treatments except to note the necessity for interdisciplinary coordination in the management of the child with learning disabilities.

The use of drugs in the management of school learning problems has been both enthusiastically received and hotly contested. Drug management for children with "special learning disorders" is currently a subject of some dispute, and may reflect lack of evidence for unfailing drug effectiveness. Some rather complete reviews of the questions have appeared recently in Tarnopol (1971) and in a special issue of *Journal of Learning Disabilities* (November, 1971).

The use of psychotherapy has typically been the treatment of last resort because some psychiatrists "felt the presence of organic factors completely precluded psychiatric intervention." (Giffin, 1968) Giffin goes on to state, however, that the child psychiatrist is beginning to assume more of a role on the diagnostic and treatment team. Rabinovitch (1959) was among the first in the discipline to unite multidisciplinary treatments in a clinical setting: "No single disciplinary approach to learning problems is valid; neurological, psychological, psychiatric and educational emphases must be brought together without preconceived bias in both clinical and research work."

A Bibliography of Surveys on Treatment and Content

Although the purpose of this paper was not to provide a comprehensive review of all methods and materials in the field of learning disabilities, a bibliography is presented for those interested in pursuing this further:

Bartel, N. R., and Hammill, D. *Teaching children with learning problems: A handbook for teachers*. Philadelphia: Temple University, 1971, pp. 9-12, 28-65, 70-73, 79-82, 100-129, 133-145, 148-184.

Bateman, B. Learning disorders. *Review of Educational Research*, 1966, *XXXVI*, 1, 110-113.

Chalfant, J. C., and Scheffelin, M. A. *Central processing dysfunctions in children: A review of research, phase three of a three-phase project*. NINDS Monograph No. 9. Bethesda, Md.: U.S. Department of Health, Education and Welfare, 1969. pp. 11-17, 28-31, 34-35, 46-47, 57-58, 67-69, 80-87. 100-102, 105, 114-117, 127-129.

Haywood, H. C. (ed.) *Brain damage in school age children*. Washington, D.C.: The Council for Exceptional Children, 1968.

Kass, C. E. Learning disabilities. *Review of Educational Research*, 1969 *XXXIX*, 1, 78-80.

Kirk, S. A. *Educating exceptional children*. 2d ed. Boston: Houghton Mifflin Company, 1972.

Lerner, J. W. *Children with learning disabilities*. Boston: Houghton Mifflin Company, 1971.

McCarthy, J. J., and McCarthy, J. F. *Learning disabilities*. Boston: Allyn and Bacon, Inc., 1969.

Myers, P., and Hammill, D. *Methods for learning disorders*. New York: John Wiley and Sons, 1969, pp. 67-296.

Rogan, L. L., and Lukens, J. E. Education, administration and classroom procedures. In *Minimal brain dysfunction in children: educational, medical and health related services, phase two of a three-phase project*. N & SDCP Monograph, Public Health Publication No. 2015. Washington, D. C.: U.S. Department of Health, Education and Welfare, 1969, pp. 21-30.

Tarnopol, L. *Learning disorders in children: Diagnosis, medication, education*. Boston: Little, Brown, and Company, 1971, pp. 253-301, 320-325.

Wold, R. M. (ed.) *Visual and perceptual aspects for the achieving and underachieving child*. Seattle, Washington: Special Child Publications, Inc., 1969.

Conclusions. Traditional treatments have provided the theoretical positions from which to add to interdisciplinary knowledge and exchange. The following conclusions are drawn from the foregoing:

1. The selected treatments contain a unique combination of clinical intuition with educational intervention. Many of the authors of these treatments developed theoretical positions from clinical experience with deviant children.

2. The treatments are aimed at different aspects of development. Many concentrate on early skills which are assumed essential to later development. Other treatments emphasize direct intervention in academic subjects with which the child is having difficulty.

3. Most treatments are suitable for individualized or small group instruction, but not for large-group instruction.

4. Many treatments are not specific to the child with learning disabilities, but may be used effectively in developmental programs for children without deficits.

5. There is little or conflicting evidence on the efficacy of nearly all treatments, although some have been researched more than others.

6. The treatments are neither mutually exclusive nor exhaustive. While there are similarities among treatments, or parts of treatments, no one treatment has been demonstrated to be effective with all learning-disability children.

Whether teachers use these treatments in practical situations, or whether these are merely textbook coverage, must be studied. Therefore, the LTI undertook more surveys, this time looking at two aspects of the real world: (a) what publishers say about the methods and materials they publish, and (b) what teachers say they use.

Survey of Commercial Materials

In the last decade, public school services for learning-disability children have burgeoned, creating a great demand by teachers for methods and materials for use with these students. This demand has been met by publishing companies with an onslaught of materials which are said to be designed for use with learning-disability children.

The LTI has attempted to evaluate the interaction between the demands of teachers for appropriate remedial materials and the publishing companies' products. One hundred fifty publishing companies were requested to provide information about the learning-disability materials which they have available. The companies were asked for a brief description of these materials and for any research which many have been done with them. Replies, many of which were in the form of company catalogs, were received from 49 companies.

Data obtained from the replies were placed into a table (given in Appendix Q) which gives a listing of the publishers, the items or materials and their prices, the types of problems for which the materials were intended, and the research cited by the publishers.

The conclusions which may be drawn from the publishers' information are the following:

1. Although information and related research was requested for materials specific to learning-disability students, publishers gave information about materials for other handicaps, which indicates that they may not have a clear definition of learning disabilities.

2. Prices vary greatly, but many materials are expensive.

3. Little research was cited by the companies. Many publishers did not indicate that research had been done with their products, although such research may be found in the literature. This indicates that not all publishers keep up with pertinent research.

Catalogs. Many companies sent catalogs in response to the request for information. The catalogs were also analyzed for types of materials indicated for learning disabilities. These materials were logically grouped into 11 types: auditory perception, language development, motor training, remedial math, remedial reading, phonics, social skills, spelling, thinking skills, visual perception, and writing. Then the following conclusions were drawn:

1. The three types for which there are the most materials are visual perception, motor training, and remedial reading. These three areas account for 50% of the total number of materials. Taken alone, visual perception materials are the largest group (18%).

2. There are many more materials for visual perception than for auditory perception.

3. Materials from the five types dealing directly with school subjects (phonics, remedial math, remedial reading, spelling, and writing) account for 41% of the total listed.

4. The two types with the fewest materials are spelling and social skills.

5. There are many more materials for early or developmental skills and more for elementary-aged children than for older children.

6. Many materials appear suitable for both developmental and remedial uses.

Recommendations. John McLeod, a consultant to the LTI, has suggested that the large quantities of materials being produced for use with learning-disability students prohibit the extensive evaluation of such materials through research, and yet there remains the very real need of such evaluation. He proposes that an organization act as a "Good Housekeeping Institute" which would be responsible for providing a "seal of approval" on the basis of evaluations of materials in actual use in practicum situations by clinical staff or by students working under supervision in approved universities. Under this plan, selected universitites would utilize materials in conjunction with practicum classes and remedial education, and then would complete a prepared questionnaire which covers such topics as length of time used, reaction of teacher, reaction of students, type of students, and any objective results obtained. The organization would then collate the results from the evaluating universities on a given set of materials and would award or not award the seal. If some materials seem to hold exceptional promise or are widely used, a further stage of evaluation could follow which would consist of more rigorous, controlled field testing.

The LTI suggests that the IMC/RMC Network described on page 205 might be the appropriate organization.

Survey of DCLD Membership

As a measure of the impact of published materials and popularized treatments, DCLD members were asked which materials and techniques they favored and how they utilized these. Three hundred eighty-two DCLD members named 993 different materials and techniques which were classified into 15 categories. These categories are listed below with the percentage of choices for each category in decreasing order of frequency:

Category	Percentage
Remedial Reading	27.0%
Miscellaneous	18.0%
Visual Perception	17.0%

Motor training	10.0%
Language development	8.0%
Remedial math	6.0%
Auditory perception	5.0%
Behavior management	2.0%
Games	1.5%
General tests	1.0%
General texts, methods, and authors	1.0%
Spelling	1.0%
Thinking skills	1.0%
Writing	1.0%
Social skills	.5%

A list of all methods and materials named by the DCLD members appears in Appendix R. The above categories are defined, methods and materials falling under each category are listed and the number of persons naming each material is presented.

Conclusions. The following conclusions were drawn from the above lists:

1. By far the largest percentage of responses fell into the traditional category of remedial reading.

2. The three categories of remedial reading, visual perception, and miscellaneous taken in 62% of the materials.

3. Miscellaneous materials, one of the largest categories, contains materials which teachers make and/or use in their own manner. They do not come with specific instructions.

4. The four largest categories (excluding miscellaneous) are reading, visual perception, motor training, and language development.

5. Five categories (general tests; general texts, methods, and authors; spelling; thinking skills; and writing) each contain 1% or less of the responses.

Favorite Materials. Materials which received 20 or more choices are considered to be favorite materials. These are listed below by category:

Auditory perception	
Developmental Learning Materials	29
Behavior management	
Behavior modification	30
Games	
None met criterion of 20 or more.	
General tests	
None met criterion of 20 or more.	
General texts, methods, and authors	
None met criterion of 20 or more.	
Language development	
ITPA	27
Peabody Language Development Kit	76
Valett--Remediation of LD	35
Miscellaneous	
Chalk, chalkboards, chalkboard writing	29
Language Master	57
Tapes, tape recorders	55
Teacher-made instructional materials	40
Motor training	
Balance beam	48
Kephart tests and program	51
Remedial math	
Cuisinaire Rods	24
Stern Structural Arithmetic	43
Remedial reading	
Distar	38
Fernald VAKT method	44
Gillingham-Stillman-Orton	35
Language experience approach	25
Merrill Linguistic Series	22
Phonetic Approach to Reading	34
SRA reading programs	56
Sullivan Programmed Reading Program	59
Social skills	
None met criterion of 20 or more.	
Spelling	
None met criterion of 20 or more.	
Thinking skills	
None met criterion of 20 or more.	

Visual perception

Continental Press materials	26
Developmental Laboratory Materials	40
Dubnoff School Program	22
Frostig Program	118
Getman programs and materials	20
Michigan Language Program	34
Parquetry	29
Pegboards	36
Puzzles	32
Teaching Resources Visual Materials	21

Writing

None met criterion of 20 or more.

Conclusions on Favorite Materials. These conclusions were drawn based on the listing of favorite materials:

1. Most of the favorite materials are commercially made, but a large number of them leave actual method of use up to the teacher (pegboards, chalkboards, etc.)

2. Some of the materials and/or techniques are described in textbooks, but the majority are not.

3. Some categories have no favorites at all, and the categories of reading and visual perception have more than the others put together. These two categories, of course, would be related.

4. Most of the materials have not been tested in use with learning-disability children.

Types of problems. Responses to the incomplete statement "Typical problems for which I use the above materials and techniques are. . ." were analyzed. One hundred twenty-three types of problems were classified under 13 groupings and these groupings are given below along with the percentages of responses for each:

Problems	Percentage
Auditory perception problems	16%
Visual perception problems	14%
Reading and phonic problems	14%
Motor problems	14%
General learning-disability problems	11%
Language development problems	10%
Math problems	5%

Attitudinal and emotional problems	4%
Thinking problems	4%
Spelling problems	2%
Other handicaps	2%
Social skill problems	2%
Writing problems	2%

Appendix S lists the specific problems indicated in the response according to these 13 groupings, which are given in rank order of decreasing frequency as they are above.

Conclusions. The following conclusions were drawn from the replies:

1. Terminology varies a great deal at the clinical level in the field; it ranges from lay parlance to esoteric neurological vocabulary.

2. Teachers seem to think in terms of channels and academic subjects.

3. Teachers seem to think in terms of elementary grade subjects, i.e., skills areas rather than content subjects.

4. The top choices are traditional ones which have been talked about for years, i.e., auditory, visual, motor, reading, and language problems.

Summary of Empirical Investigations

The methods and materials brought to light in the previously-discussed empirical investigations share certain characteristics which may help to delineate the present status of service in the field of learning disabilities.

First, therapy for the learning disabled seems limited to the elementary school age group. Little attention is directed toward preschoolers or adolescents.

Second, the bulk of materials and methods fall into two categories: those for improving basic academic skills and those for improving perceptual-motor skills. These two divisions are seen in the Rogan and Lukens survey in Task Force II report (77% academic skills, 56% fine visuomotor), in the analysis of publishing company catalogs (41% academic skills, 42% perceptual-motor skills), and in the DCLD survey (35% academic skills, 32% perceptual-motor skills).

It is interesting to note that reading and visual perception materials are leading categories, the former in the DCLD survey and the latter in the analysis of catalogs. However, the most frequently-mentioned problem area (in the DCLD survey) was that of auditory perception. It may be that materials for visual and reading problems, which are usually worksheet-type materials, are easier and less costly to produce and use than auditory perception materials which may require such expensive equipment as tape recorders, etc.

Third, methods and materials are for the most part untested or have received bad reviews. This, however, does not seem to prevent their widespread use.

In conclusion, the learning-disability teacher of today, as reflected by the DCLD membership, appears to be one who uses both traditional and commercial materials and methods. The population of children served is most typically of elementary school age and the most probable course of treatment for educational malaise is either academic skills therapy or perceptual-motor training.

CONCLUSIONS AND RECOMMENDATIONS

The popularity of any method or material is not directly related to efficacy of that method or that material. The possibility of an ideal cookbook(s) must be faced by the field if the demands for methods and materials are to be met. Validity and reliability considerations alone require that methods and materials be subjected to measures which will indicate whether these actually will improve performance and do so consistently. The priority in the field appears to be the need for matching certain deficits within children with the appropriate remedial recipes. The various schools of thought regarding treatment have resulted in many different cookbooks with varying degrees of popularity and efficacy. If criteria for specialized treatments could be specified, then it would be possible to evaluate existing approaches and to construct new and better cookbooks. What is certain is that decisions must be made on the basis of sound diagnosis.

Scholars in the field of learning disabilities have adopted divergent theories about learning. The most extreme divergence is between the strict behaviorist point of view and the mediation position. These approaches differ in the emphasis placed upon the various elements in the learning situation, i.e., the Stimulus, the Organism, and the Response. The category of Responses, especially in school tasks, has been the focus of the behaviorists. In contrast, mediationists have concentrated on the Organism which is viewed as a complex network through which stimuli and responses circulate. The difference between the two positions lies more in emphasis than in exclusion. Some scholars, however, have adopted a third position, which can be termed a "systems" approach with the emphasis on Stimuli. Stimuli can be defined as all the external variables in the teaching situation which interact with the organism, e.g., teacher, method, material, environment. There appears to be a need to examine the three theoretical positions, understand these thoroughly, and subject significant aspects to rigorous research methodology. (See Seminar of Scholars, Appendix G).

A promising development for a Stimuli-oriented approach is programmed conditioning for dysphasic children as described by Gray and Fygetakis (1968). The basis for programmed conditioning rests upon the integration of (a) efficient behavior modification techniques which can modify and/or control specific behavior, and (b) sophisticated programmed instruction which provides acquisition of basic language structure and performance. The major premise is held that "by giving these children certain function words through programmed conditioning they would be able to generate spontaneous constructions and also be able to acquire additional basic language structure without further specific training."

What guidelines are available to the classroom teacher for selecting instructional materials? This question is probably one of most immediate concern. One practical answer is provided by Carlene Van Etten (1970) who designed a "Materials Selection Guide," along with guidelines for completing a narrative analysis of a single piece of instructional material, which can be used by the teacher to advantage.

Robert Ridgway, a consultant to the LTI, underscored the impact of the IMC/RMC Network on special education, particularly in sparsely-settled areas and in the areas where school districts are not well-enough funded to permit the purchase of large numbers of instructional devices. The IMC's have made more materials available to teachers, have made training in the proper use of materials available to teachers, and have made people more aware of the newest materials which come on the market. Materials frequently dictate learning style and the kind of approach used by a teacher will also affect the way a youngster learns. The suggestion was made by Dr. Ridgway that Bloom's taxonomy in the cognitive, affective, and psychomotor domains might be useful to the teacher in the choice of appropriate methods and materials.

John McLeod, a consultant to the LTI, has suggested that the summarized theoretical treatments might be taken to represent a pool of potential treatments (analogous to an original pool of items from which a standardized test is to be constructed) and then proceed to validation. One approach, states McLeod, is to plan a progressive task analysis of the manifest learning-disability problems leading toward the selection of more elementary analytic variables by (a) elements that appear in programs which have "surfaced" and which are summarized in the present document, and (b) a basic theoretical model.

Patricia Myers, a consultant to the LTI, provided the staff with a prepared set of statements after reviewing sections of this report:

Given:

1. There is little we KNOW regarding subject, method, and materials variables in the identification and remediation of learning disabilities; more that we SUSPECT; and much that we BELIEVE without evidence.

2. The following statements are, therefore, BELIEFS:

    a. Language disorders and other learning disabilities result from some type of central nervous system dysfunction, whether that dysfunction be related etiologically to anatomic or physiologic deviation.

    b. Therefore, learning disabilities do not result from, but may occur concommitantly with, mental retardation, emotional disturbance, or economic deprivation. Obviously, then, learning disabilities may occur in the absence of other disorders. The learning disabled child may ALSO be mentally retarded, emotionally disturbed, or economically deprived. It is most imperative that we do not confuse, for example, the "linguistically different" child with the "linguistically deviant" child.

c. There is no present substantiation for the idea that learning disabled children need different types of treatment from those used with children who have other, better-defined, more easily delineated, problems.

d. There may be some substantiation for the belief that ALL handicapped children need individualized treatment which includes specialized techniques and specially-developed materials.

e. However, we are unable at present to present evidence of isomorphic relationships between certain specific learning disabilities and certain specific modes of treatment.

f. In the field of learning disabilities, little attention has been paid to the acquisition and development of language or to the treatment of language disorders in children. The area of language pathology is the province of no one group of professionals, but that which is not the responsibility of one group is often regarded as the responsibility of no group. Professionals in learning disabilities have tended to view language as a conglomerate of psycholinguistic abilities, including perceptual memory, symbolic representation, etc. Linguistic performance, indeed, is dependent upon physiologic, perceptual, and assorted cognitive factors, but linguistic competence is not. We have been terribly remiss in treating language disorders as only psycholinguistic problems without investigating children's linguistic competence as well as their performance in terms of linguistic structures.

3. There is presently limited or no evidence for the following concepts:

   a. Development, in any area, must proceed in an unbroken line of gradual differentiation which may be somewhat divided into phases or stages, and it must be complete in all particulars if normal function is ultimately to occur.

   b. Children with learning disabilities have problems which are discrete and which can be isolated in modality, the avenue of sensory input and motor output; in processing, the input, association, and output processes; and/or in the quality or complexity of function, perception, symbolization, abstraction, etc.

c. Treatment of a specific deficit (real or not), as in visual perceptual ability, will transfer so that other symptomatology will disappear. For example, a non-verbal child may be taught various auditory perceptual skills, such as discrimination, because it is assumed that he does not talk because of his perceptual difficulties. However, although he may learn to discriminate speech sounds, blend them, imitate words, etc., there is still no assurance that he will learn to talk.

d. Children who have overwhelming problems in one area, such as visual perceptual ability, can be taught compensatory techniques whereby they are enabled to by-pass "normal" modes of learning and to learn material which is usually considered visual by means of some other mode. This is obviously the approach that has been used in teaching language to the deaf and it has not proved overwhelmingly successful.

Critical, Interesting, and as yet Unanswerable Questions:

1. What role does language play in concept development and, in turn, in conceptual disorders? If a child has difficulty in attaching verbal labels to objects, events, or concepts, does he perforce have problems with the concepts themselves? If he has difficulty with conceptual tasks, e.g., constructing superordinate categories, does he necessarily have a language disorder? Perhaps just as important would be the question as to whether treatment in one area is dependent upon the incorporation of skills, tasks, activities, etc., from the other area. Can we teach the non-verbal child to talk without teaching him concepts (or at least requiring him to give evidence that he has the concepts) and can we teach the child who is having difficulty forming concepts without teaching him language?

2. If a child does not "have" (according to some, it would not be a question of "learn") the basic, or universal, phonologic, syntactic, and, even, semantic structures that underlie language, can we teach them to him? What is the efficacy of programs, such as those developed by the Monterey Institute, in teaching a child language? Such programs purport to teach syntactic and morphologic structures, as well as transformations; can they, do they?

3. Can we subscribe to the theories of developmental linguists who say that language is not learned but is species-specific and innate? Can we agree that there is no disorder of children, with the possible exception of severe brain damage, which is devastating enough to prevent the acquisition of language, and that non-verbal children really have other kinds of problems

(memory deficits, perceptual problems, etc.) which affect their linguistic performance but not their linguistic competence? If this is true, what are the implications for treatment?

4. Can we separate learning disabilities from academic difficulties? Must we continue to define learning disabilities, particularly in school-age children in terms of academic discrepancies, e.g., two years' retardation in reading but normal or expected achievement in arithmetic? If we are dependent upon discrepancies in academic achievement for the identification of learning disabled children, then how do we decide which children have academic lags because of poor instruction, negative emotional conditioning related to certain school subjects like arithmetic or reading, or socio-cultural factors related to attitudinal variables? Moreover, how do we identify pre-school children at age three or four who will at age nine or ten exhibit the achievement discrepancies which seem to be our criteria for identifying learning disabilities?

5. Related to the whole concept of discrepancies in academic achievement is the question of whether treatment should focus upon the academic subject matter which is giving the child trouble or whether it should focus upon some organismic variable, such as memory or perception which is often assumed to underlie the symptomatic academic problem. The whole area of transfer should be questioned, but more basically, the area of "process" training should be investigated carefully. In only one aspect, for example, we must question whether we can, first, measure short-term memory, whether there is such an entity as auditory memory as opposed to visual memory, whether we can "train" or increase the memory span, and whether the apparent, surface fact that a child cannot remember printed letters is really a memory problem.

6. Can we identify specific syndromes of learning disability? Most of us who have surveyed the literature have found that authors delight in identifying syndromes but we have also found that these syndromes overlap in a bewildering fashion. This question, obviously, is related to "subject variables," but how are we going to make sensible statements about methods and materials if we do not know what kinds of disabilities we are talking about and whether the problems of learning disabled children do arrange themselves in some semblance of order into identifiable syndromes?

7. Could we identify syndromes, or perhaps lay the whole question of syndromes to rest, by systematically implementing various methods across groups of learning disabled children, regardless of their learning "profiles," and thereby arrive at validation of certain methods (and/or materials) for certain kinds of children? In some respects this is the approach taken by Project CHILD in Dallas and Irving, Texas.

8. Many commercially produced materials appear to be well-constructed (some are abominable) in that they present tasks in sequence with directions regarding teaching techniques and with references to supplementary materials. It is at best, however, a gamble as to whether the materials are related to the learning disability exhibited by the child. The better programs and materials provide a "cookbook," but a cookbook for whom and what we are not sure. This is undoubtedly the greatest disadvantage to prepared programs; their use results in taking the child out of one canned program, the regular curriculum, which is not appropriate for him and putting him into another, equally inappropriate, program. If we lived in the best of all possible worlds and had the best of all possible reading programs, would every child, then, learn to read using this one program? That is patently a rhetorical question, but materials are being used as if the answer to the question were positive.

REFERENCES

Alper, F. G., and White, O. R. Precision teaching: A tool for the school psychologist and teacher. Journal of School Psychology, 1971, 9, 446-454.

Barsch, R. H. A movigenic curriculum. Bulletin No. 25. Madison, Wisconsin: Department of Public Instruction, Bureau for the Handicapped, 1965.

Bartel, N. R., and Hammill, D. Teaching children with learning problems: A handbook for teachers. Philadelphia: Temple University, 1971.

Bateman, B. Learning disorders. Review of Educational Research, 1966, XXXVI, 1, 110-113.

Chalfant, J. C., and Scheffelin, M. A. Central processing dysfunctions in children: A review of research, phase three of a three-phase project. NINDS Monograph No. 9. Bethesda, Md.: U. S. Department of Health, Education, and Welfare, 1969.

Clements, S. D. Minimal brain dysfunction in children: Terminology and identification, phase one of a three-phase project. NINDB Monograph No. 3. Public Health Service Bulletin No. 1415. Washington, D.C.: U. S. Department of Health, Education, and Welfare, 1966.

Cruickshank, W., and others. A teaching method for brain-injured and hyperactive children. Syracuse, New York: Syracuse University Press, 1961.

Delacato, C. H. The treatment and prevention of reading problems. Springfield, Ill.: Thomas, 1959.

Edgington, R., and Clements, S. Indexed bibliography on the educational management of children with learning disabilities (Minimal brain dysfunction). Chicago: Argus Communications, 1967.

Erickson, D. K. The CEC Information Center: Progress and potential. Arlington, Va.: The CEC Information Center on Exceptional Children, 1970.

_______. Network resources for teachers of the handicapped. (Adapted from a presentation by P. J. Newbury at the 94th Annual Meeting of the AAMD, 1970). Arlington, Va.: Special Education Network, 1970.

Estes, W. K. Learning theory and mental development. New York: Academic Press, 1970.

Fernald, G. Remedial techniques in basic school subjects. New York: McGraw-Hill, 1943.

Frostig, M. Education for children with learning disabilities. In H. R. Myklebust (Ed.) Progress in learning disabilities. Vol. I. New York: Grune and Stratton, 1968.

_______, and Horne, D. *The Frostig program for the development of visual perception*. Chicago: Follett Publication Co., 1964.

Getman, G. N. Visual success in reading success. *Journal of the California Optometric Association*, 1961, *29* (5), 1-4.

Gillingham, A. B., and Stillman, B. L. *Remedial work for reading, spelling, and penmanship*. New York: Hackett and Wilhelms, 1936.

_______. *Remedial training for children with specific disability in reading, spelling, and penmanship (7th ed.)*. Cambridge, Mass.: Educators Publishing Service, 1956.

Giffin, M. The role of child psychiatry in learning disabilities. In H. R. Myklebust (Ed.) *Progress in learning disabilities*. Vol. I. New York: Grune and Stratton, 1968.

Gray, B. B., and Fygetakis, L. Mediated language acquisition for dysphasic children. *Behavioral Research and Therapy*, 1968, *6*, 263-280.

Haring, N. G., and Miller, C. A. (Eds.). *Minimal brain dysfunction in children: Educational, medical and health related services, phase two of a three-phase project*. N&SDCP Monograph, Public Health Publication No. 2015. Washington, D.C.: U. S. Department of Health, Education, and Welfare, 1969.

Haywood, H. C. (Ed.). *Brain damage in school age children*. Washington, D.C.: The Council for Exceptional Children, 1968.

Hildreth, G. *Learning the three R's*, Chapters 19-21. Minneapolis, Minn.: Educational Test Bureau, 1947.

Johnson, D., and Myklebust, H. R. *Learning disabilities: Educational principles and practices*. New York: Grune and Stratton, 1967.

Journal of Learning Disabilities, Special Issue, November, 1971, *4* (9).

Kass, C. E. Learning disabilities. *Review of Educational Research*, 1969, *XXXIX*, 1, 78-80.

Kelly, E. J. *Philosophical perspectives in special education*. Columbus, Ohio: Charles E. Merrill, 1971.

Kephart, N. C. *The slow learner in the classroom*. Columbus, Ohio: Charles E. Merrill, 1960.

Kirk, S. A. *The diagnosis and remediation of psycholinguistic disabilities*. Urbana, Ill.: University of Illinois Press, 1966.

_______. *Educating exceptional children*. 2nd ed. Boston: Houghton Mifflin, 1972.

_______, and Kirk, W. D. *Psycholinguistic learning disabilities: Diagnosis and remediation*. Urbana, Ill.: University of Illinois Press, 1971.

_______, and McCarthy, J. J. Illinois Test of Psycholinguistic Abilities. Experimental ed. Urbana, Ill.: University of Illinois Press, 1961.

_______, McCarthy, J. J., and Kirk, W. D. The Illinois Test of Psycholinguistic Abilities. Revised ed. Urbana, Ill.: University of Illinois Press, 1968.

Lerner, J. W. Children with learning disabilities. Boston: Houghton Mifflin, 1971.

Lovitt, T. Behavior modification: The current scene. Exceptional Children, 1970, 37, 85-93.

Mase, D. J. (Ed.). What is special about special education? Pamphlet series, Florida Center of Clinical Services. Gainesville, Fla.: University of Florida, 1952.

McCarthy, J. J., and McCarthy J. F. Learning disabilities. Boston: Allyn and Bacon, 1969.

Monroe, M. Children who cannot read. Chicago: University of Chicago Press, 1932.

Myers, P., and Hammill, D. Methods for learning disorders. New York: John Wiley and Sons, 1969.

Myklebust, H. R. Psychoneurological learning disorders in children. In S. A. Kirk and W. Becker (Eds.) Conference on children with minimal brain impairment. Urbana, Ill.: National Society for Crippled Children and Adults, Inc., 1963.

Orton, S. T. Reading, writing and speech problems in children. New York: Norton, 1937.

Ravinovitch, R. Reading and learning disabilities. In S. Arieti (Ed.) American handbook of psychiatry. New York: Basic Books, 1959.

Rappaport, S. R. Public education for children with brain dysfunction. Syracuse: Syracuse University Press, 1969.

Roach, E. C., and Kephart, N. C. The Purdue Perceptual-Motor Survey Test. Columbus, Ohio: Charles E. Merrill, 1966.

Rogan, L. L., and Lukens, J. E. Education, administration, and classroom procedures. In Haring and Miller (Eds.) Minimal brain dysfunction in children: Educational, medical and health related services, phase two of a three-phase project. N&SDCP Monograph, Public Health Publication No. 2015. Washington, D.C.: U. S. Department of Health, Education, and Welfare, 1969, 21-30.

Siegel, E. Special education in the regular classroom. New York: John Day, 1969.

Slingerland, B. H. *Specific language disability children: A guide for primary teachers.* Cambridge, Mass.: Educators Publishing Service, 1971.

Strauss, A., and Kephart, N. C. *Psychopathology and education of the brain-injured child*. Vol. II. New York: Grune and Stratton, 1955.

Strauss, A., and Lehtinen, L. *Psychopathology and education of the brain-injured child*. Vol. I. New York: Grune and Stratton, 1947.

Tarnopol, L. *Learning disorders in children: Diagnosis, medication, education*. Boston: Little, Brown and Co., 1971, 253-301, 320-325.

Van Etten, C. *Materials selection guide*. Olathe, Kansas: Selected-Ed., 1970.

Wold, R. M. (Ed.). *Visual and perceptual aspects for the achieving and underachieving child*. Seattle, Wash.: Special Child Publications, 1969.

ADMINISTRATIVE AND SERVICE ARRANGEMENTS IN LEARNING DISABILITIES

J. Lee Wiederholt

with

Donald Deshler

Marilyn Johnson

Helen Marie Pearce

August 1972

INTRODUCTION

Previous sections of this report have contained discussions on the definitions, characteristics, incidences, and correlates of pupils with learning disabilities as well as the instructional methods and materials used in providing educational service to students designated as having this handicapping condition. The extent and effectiveness of this service depends, in part, upon the availability of financial resources and personnel to adequately manage the task of planning, organizing, developing, maintaining, and evaluating service arrangements to students purported as having learning disabilities.

Therefore, the purpose of this section of the final report is to describe the administrative and service arrangements in the area of learning disabilities and, on the basis of this description, to make recommendations for future action. The first part of this section deals with the activities of personnel in the U.S. Office of Education, the second part contains a limited description of the activities of personnel in state educational agencies, while the third part presents information concerning specific areas of administrative and service practices. The summary section includes a listing of the conclusions from this survey and recommendations.

FEDERAL ASSISTANCE

A great deal of activity across the nation in providing services to the learning disabled has been generated by the United States Office of Education (USOE) Washington, D.C. This section includes: (1) a description of the historical development in providing services to the learning disabled by USOE, (2) a discussion of the State Child Service Demonstration Programs funded by the Bureau of Education for the Handicapped (BEH) in the USOE, (3) an overview of other programs funded by USOE, and (4) a summary of these activities.

Historical Development

The First Annual Report of the National Advisory Committee on Handicapped Children (January 31, 1968) estimated that there were approximately one to two million children who can be defined as learning disabled and that only a few of them were receiving special aid. On February 28, 1969, Senator Ralph Yarborough of Texas introduced the Children with Learning Disabilities Act of 1969 (S. 1190). Representative Roland Pucinski of Chicago introduced a similar bill in the House of Representatives (HR 8660).

The Children with Learning Disabilities Act amended Title VI (known as the Education of the Handicapped Act of 1967) of the Elementary and Secondary Education Act by specifically providing authority to the U.S. Office of Education to establish programs for pupils with learning disabilities.

Three types of programs were authorized by this act.

1. Grants and contracts may be used to support projects for research and related activities, surveys, and demonstrations relative to the education of children with learning disabilities.

2. Grants and contracts may be awarded to provide professional or advanced training to personnel concerned with the education of children with learning disabilities.

3. Grants and awards may be rewarded to assist in the establishment and operations of model centers designed to improve the education of children with learning disabilities.

The exact wording of the bill relative to the model centers (number 3) states that the centers shall:

> . . . (a) Provide testing and educational evaluation to identify children with learning disabilities who have been referred to such centers, (b) Develop and conduct model programs designed to meet the special education needs of such children, and (c) Assist appropriate education agencies, organizations, and institutions in making such model programs available to other children with learning disabilities.
>
> In making grants and contracts under this section, the Commissioner shall give special consideration to applications which propose innovative and creative approaches to meeting the educational needs of children with learning disabilities, and those which emphasize the prevention and early identification of learning disabilities (Public Law 91-230).

The legislative mandate and appropriations of Public Law 91-230, Title VI, Part G, enabled BEH to award grants to State Educational Agencies for the purpose of developing Child Service Demonstration Programs (CSDP). These programs, after rigorous evaluation and refinement, will be utilized as models in stimulating statewide service to the learning disabled. Eight State Educational Agencies were awarded grants for the fiscal years 1971-73 for this purpose.

In addition to these CSDP's, the Leadership Training Institute in Learning Disabilities (LTI) was funded by BEH. The purposes of the LTI for the first year of funding were: (1) to prepare a document which surveys and analyzes the field of learning disabilities in relation to present knowledge and service, (2) to prepare a document which surveys and analyzes present training activities, (3) to develop plans for implementing strategies in research, training and services, and (4) to provide technical assistance to the Child Service Demonstration Centers.

Technical assistance (number four) was accomplished through: (a) a survey and analysis of the proposals of the eight states receiving awards, (b) communication with each CSDP regarding its needs for technical assistance, (c) professional consultation by LTI staff members to the eight state projects, (d) coordination of programs through two group meetings of the leadership personnel from the state programs, and (e) other coordinating services upon mutual agreement. A description and discussion of each CSDP follows.

Child Service Demonstration Programs

The eight states funded by BEH for 1971-73 were: California, Colorado, Mississippi, New Jersey, Ohio, Utah, Washington, and Wisconsin. An abstract of each program as well as a discussion of some aspects of the programs is presented.

California Child Service Demonstration Program. The purpose of the California CSDP grant is to provide an intensive service model designed to improve existing public school services for children with specific learning disabilities and simultaneously to increase the competence of teachers currently serving learning disabled children in public school Educationally Handicapped Minors Programs. The operational model will be located in the San Francisco Unified School District in San Francisco. The proposed model will operate within the framework of California's Educationally Handicapped Minors Program. Three major functions are performed through the cooperation of the project personnel and other significant school persons. These functions are: (1) defining the apparent problem and proposing a plan; (2) providing the services to implement the plan; (3) monitoring continuously the services.

There are three major structural parts to the model. First, a field research teacher will serve as an educational consultant/liaison agent for parents and for general and special educators from the initial request for service by the referral unit to the final program plan for each child. Second, a research teaching lab (an intensive service center) will be established in a public school and will be manned by a lab research teacher who will work with children with specific learning disabilities in both educational assessment and educational planning. Third, both the field research teacher and the lab research teacher will serve as demonstration teachers and supervisors of practicum for special and regular teacher interns. Thus, the intensive service project will provide children with specific learning disabilities and teacher interns with the services, the space, and the time within which they can demonstrate improvement in their performance in school related tasks both in learning and in instructing.

Personnel for the intensive service project include a full-time project head, two field research teachers and three lab research teachers in three research teaching labs, as well as one full-time clerk typist. Of the three research teaching labs, two will be in elementary schools and one in a junior high school. The two elementary labs will serve no more than sixteen buildings with a total population of 6,400. Each will enroll no more than 12 pupils during any eight week block of time. The junior high lab will serve no more than three buildings with 3,600 pupils. It will serve from 12 to 18 pupils per day with no more than eight at one time. A total of 144 to 168 pupils will be served. The training aspect of the program will serve from 36 to 48 teacher interns. A local project advisory council will have parent representation.

Replication of the intensive service model during the first phase is aimed at nine San Francisco Bay area counties. A statewide project reflection council will assist in ascertaining replication potentials. It is predicted that it will be replicated in five districts within two years and in ten districts within three years, if permanent funding is available. Replication or adaption of successful components through the state is eventually possible.

Colorado Child Service Demonstration Program. The purpose of the Colorado grant is to replicate throughout Colorado the successful program for educationally handicapped children at the District 50 Resource Center, Westminster, Colorado. The Resource Center's intervention techniques involve a multi-disciplinary team including four teacher experts who diagnose, prescribe, implement, and evaluate programs for individual, elementary educationally handicapped children as well as work with the regular class teacher and parents.

The replication strategy involves the use of the Resource Center for teacher training of teams (four teachers each) from other school districts. These teams will then set up satellite Resource Centers in their districts. Also, a training package (consisting of presentations in different media of training methods and materials) will be disseminated to participating centers to aid in the use of the team approach and to serve as a multiplier within the district.

It is estimated that eight new centers will be replicated from the model during the first two years, 12 the third. After the fourth year, project money may not be needed since the training packages will have been developed and will carry on the multiplier effect.

Mississippi Child Service Demonstration Program. The Mississippi CSDP grant is intended to be a demonstration educational program in learning disabilities that may be replicated by other facilities. The demonstration model will provide a three-phase approach to the movement of pupils within the specific learning disabilities program. Located in Woodley Elementary school of the Hattiesburg Public School System will be (1) a semi-self-contained learning laboratory, (2) a resource center utilized as needed for the remediation of specific learning disabilities, (3) a prescriptive instructional program implemented within the regular classroom. The Hattiesburg Public School System will work cooperatively with the State Special Education Office and the University of Southern Mississippi in planning, implementing, evaluating, and replicating the proposed project. In the program, three learning disabilities teachers, one physical education specialist, one assistant to the psychologist, and school instructional staff will work with approximately 40 pupils. An eclectic approach to the remediation of specific learning disabilities through prescriptive teaching will be used. The goal of the proposed model is to provide prescriptive, instructional programs for identified learning disabilities students which will enable the attainment of objectives of the classroom. Pursuance of this goal will be implemented through a resource team working cooperatively with school personnel.

The State Special Education Office will organize and implement the replication strategy. It is predicted that 160 new programs in about 60 school districts will be organized within two years following establishment of a successful model center. The State Legislature has passed a resolution calling for a study of how to cope with the problem of educating Mississippi's children with learning disabilities programs especially attractive to local school districts. Mississippi's replication strategy will involve the existing state financing law plus little new money, federal funds for teacher training, much work by interested professional and lay groups and agencies, but hope of additional state funds.

Continuous evaluation is built into the program with prescriptive teaching techniques which require a cycle of current diagnosis of educational needs, implementation of remedial learning activities and measures of pupil progress.

In addition, comments and responses to behavioral rating scales from school personnel, parents and visitors will be recorded and a battery of pre-and post-tests will be given. Sociometric techniques, behavior checklists and semantic differential scales will be used to evaluate affective behavior and case studies will be supplied on individual pupils.

New Jersey Child Service Demonstration Program. The plan of the New Jersey CSDP grant is to provide for development of an easy accessible statewide system for providing instruction to learning disabled children, their parents, teachers, and others who serve children. Children with diagnosed learning disabilities will, through the use of a data bank available at the University State College at Buffalo Special Education and Instructional Materials Center, be provided with instructional programs and activities. A data link will be established between the Parsippany-Troy Hills Computer Center and the Computer Center at the University of Buffalo, which will allow for the rapid retrieval of instructional information geared to the needs of learning disabled children. Initially, services will be available to the Parsippany-Troy Hills School District and to children served by the New Jersey Association for Children with Learning Disabilities. Ultimately, the program proposed in the grant will provide services to all learning disabled children in New Jersey and for the parents of such children, teachers of such children and members of other professions that serve learning disabled children. Services will be available to children in public and private, non-profit schools. Instructional information will be available to those appropriately trained to interpret such information.

Participant children will have available the services of a trained specialist, a learning disabilities teacher consultant who will help the child's teacher and/or parent determine the necessary and appropriate programming for that child. The learning disabilities teacher consultant will receive information from the computer by way of teletype, and will serve as the intermediary or interpreter of this information to the professional and lay persons who utilize the information. A series of workshops will be held to acquaint teachers, parents and other professionals with the various aspects of the computer-based resource information-retrieval method. Teletype terminals will be located in a resource room in the Parsippany-Troy Hills School District, staffed by a learning disabilities teacher consultant and in the New Jersey Association for Children with Learning Disabilities facilities as well as in the State Department of Education offices.

It is anticipated that the computer-based immediate access information-retrieval system network will become a statewide project. Teletype terminals and trained professionals will be located in each school district that requests the services of the system.

Ohio Child Service Demonstration Program. The Ohio CSDP grant is designed to: (1) Develop an in-service training program model for teachers, tutors, and program consultants in learning and behavioral disorders; (2) Develop and refine an instructional program at the secondary school level; and (3) Extend and refine the identification and selection process of students at the elementary and secondary levels.

School districts from Franklin, Clark and Montgomery counties will supply a total of 15 teachers, five tutors, and two consultants for first year participation in the training part of the project. These people will receive in-service training from Ohio State University throughout the year. The participants will be assigned specific, functional, on-the-job tasks to perform. The in-service training model will be developed in this part of the program. During the second year a training package will be designed for use by the public schools in teaching behavioral approaches. Each package will contain video tape, slides, and recordings for the training program and must be used in an interlocking situation by the tutor, special teacher, and teacher consultant.

The secondary model calls for the establishment of five classroom units for SLD children by the second year, and the development of assessment procedures and instructional materials for the secondary level. Plans for the program will be available to other districts in the state and elsewhere.

The final part of the project will develop and field test an identification and assessment instrument for both elementary and secondary students. This instrument will be made available on a statewide basis for assessment of children being considered for special education help in learning and behavior disabilities.

Utah Child Service Demonstration Program. The purpose of the Utah CSDP Grant is to develop a prototype diagnostic-treatment center oriented to the remediation of basic behavioral, perceptual, and learning skills disabilities. This center will assemble and develop both diagnostic and treatment materials and procedures, will provide treatment for learning disability children and a base for systematic training, internship, and program dissemination. The center will be located in a school in a Salt Lake City School District and will be staffed by three diagnostic remedial teachers, one psychologist, one communications disorders specialist, and one secretary.

Specific goals for the project involve primarily the development of a package of materials which include a diagnostic battery, prescription strategies and specific intervention techniques. These materials will be assembled and developed in the center and used with children in small groups or in one-to-one situations. The children will be drawn from referrals given by the Salt Lake City School District. The center will also provide a setting for internship and other kinds of training.

The replication strategy for the Utah plan is to develop additional centers like the model center in four regional service districts which will cover the major part of the state of Utah. These new centers will use the diagnostic and treatment materials developed in the model center to provide direct treatment for learning-disability children and to provide additional sites for internship training. Within two years, approximately 1,300 children with specific learning disabilities will be given diagnostic and remedial services in 24 school districts in Utah.

Washington Child Service Demonstration Program. The state of Washington CSDP Grant is an attempt to establish a multiplier effect from existing programs for children with specific learning disabilities in Seattle, Spokane and Tacoma. The model is to be based on data continuously being gathered by the State of Washington's Department of Special Education called Continuous Measurement. The Continuous Measurement Model identifies some fundamental skills that every child must have in his repertoire. These skills are then continuously assessed by his teacher so that educational intervention can be made at the most advantageous time. The educational intervention which is applied is based upon behavior modification tactics.

Individuals who are currently using this Continuous Measurement Model in Seattle, Spokane, and Tacoma will be further trained in the up-to-date uses of Continuous Measurement, and they will, in turn, train regular classroom teachers especially in grades K through third to insure that these teachers will have the skills necessary to detect and identify children with specific learning disabilities at the earliest possible time in the child's life. The goal of the program is to deliver new instructional services to children in the Seattle, Spokane, and Tacoma areas in the State of Washington, increasing the number of children served from 505 to 2,340 by June of 1973.

The current Washington service plan for SLD children provides for intervention in the regular classroom, in adaptations of the regular classroom, in resource rooms, or in individual tutorial instruction. During the first year of the project, three teachers, highly trained in Continuous Measurement techniques would work within the current State program in developing a service delivery system which finds SLD children, trains their teachers, and is accountable for the children's success. Services during the first year would be confined primarily to the Seattle, Spokane, and Tacoma School Districts. During the second year of the program, twelve trained master teachers would develop further tactical procedures for helping SLD children and would share these with regular teachers through in-service training and direct aid for specific children in the classroom. In this way, approximately 1,200 teachers would be able to provide new services to approximately 2,400 children at the end of two years.

Wisconsin Child Service Demonstration Program. The Wisconsin CSDP grant is designed to increase the competencies of the regular classroom teachers in meeting the needs of youngsters with mild to moderate learning disorders in the regular school program with the aid of the skills of qualified special education personnel. Children with moderate to severe learning disabilities are currently served by self-contained and resource programs in the state. The itinerant model currently used in this state has not been highly successful because the regular classroom teachers have not been adequately prepared to provide the necessary program and because of the inability of the itinerant teachers to spend enough time with teacher and/or student. The proposed project is designed to strengthen the itinerant teacher model while at the same time provide services to a greater number of children with learning disabilities.

The initial target area is the Milwaukee Public Schools. Four elementary schools, two from the core area and two from the periphery of the city, will be identified as target schools. The student population and teachers will represent two classes of each grade two through five from each of the four schools totaling 32 classes with an average enrollment of 35. At the beginning of the first year, the total educational staff of these four schools will receive an in-service training program focusing on an overview of the field of learning disabilities and the rational for and the operational aspects of the proposed program model. Teachers receiving this in-service training will rate their students in terms of behavioral and academic attributes; and the lowest ten per cent in functioning will be referred for further medical, psychological and educational evaluation. In this way, 50 to 60 youngsters will be identified as eligible for special learning disabilities programs within the confines of this project. Two learning-disability itinerant teachers will be employed for the purposes of educational evaluation and on-going special intervention. They will develop a prescriptive teaching strategy for each child enrolled in the program and provide direct and indirect services to the regular classroom teacher and the learning disability children. The regular classroom teachers will also receive specialized courses relative to their needs and to the needs of the population identified as learning disabled.

During the second year of operation, four additional Milwaukee schools are to be identified and the same intervention approaches employed. Following demonstration of the effectiveness of the proposed program, it is anticipated that statewide replication can be accomplished through existing funding provisions.

*****

The eight CSDP proposals and mid-year progress reports were analyzed, as well as the responses of each project director to a questionnaire prepared by the LTI staff members. The following discussion is derived from these sources and is divided into six areas: (1) definition, (2) prevalence, (3) educational intervention, (4) evaluation strategies, (5) replication strategies, and (6) technical assistance.

1. Definition. The state project directors were asked if they agreed with the following definition proposed in the First Annual Report of the National Advisory Committee on Handicapped Children (January 31, 1968):

> Children with special learning disabilities exhibit a disorder in one or more of the basic psychological processes involved in understanding or in using spoken or written languages. These may be manifested in disorders of listening, thinking, talking, reading, writing, spelling, or arithmetic. They include conditions which have been referred to as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, developmental aphasia, etc. They do not include learning problems which are due primarily to visual, hearing, or motor handicaps, to mental retardation, emotional disturbance or to environmental disadvantage.

Four project directors reported they were in complete agreement with this definition. Of the remaining four directors, two felt the definition was too limited and should include the "emotionally disturbed", while one director felt that the clause "they do not include learning problems which are due primarily to. . ." should be deleted and instead read "May include problems relating to visual, etc. . ."

Two definitions were submitted as alternatives to the National Advisory definition:

> An educationally handicapped child is one whose behavior manifests itself in such a manner that it is likely to interfere with the child's own educational process or the educational process of others. Behavior should be thought of in the broad educational and psychological aspects of the term. In most instances there is an educationally significant discrepancy between his apparent capacity for language or communicative behavior and his actual level of performance (Colorado).

> Children with 'special learning disabilities' means those children who have a disorder in one or more of the processes involved in understanding and using language, spoken or written; such disorder may manifest itself in imperfect ability to listen, think, speak, read, write, spell or do mathematical calculations. Such disorder may include such conditions as auditory and visual perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia and developmental aphasia. Further, such term does include those children who exhibit marked deficits in academic and/or verbal performance, as measured against a chronological age standard. These deficits may be demonstrated in the performance of one or more of the following tasks: Listening, memory, reading, writing, spelling and arithmetic. The essential aspect of a learning disability is a discrepancy between the child's apparent potential and his performance in practice when he has to carry out some essential learning process. Such terms do not include children who have learning problems which are primarily the result of visual, hearing, or motor handicaps, or mental retardation, or emotional disturbance, or of environmental damage (Washington)."

2. Prevalence. Each project director of the CSDP was asked to estimate the prevalence of children with learning disabilities for their state using the National Advisory Definition, the definition upon which the CSDP was based, if different, and the incidence figures of learning disabilities for the state, if available. Table I presents these figures.

Inspection of the table indicates that the project directors, when employing the definition proposed by the National Advisory Committee, estimated the prevalence of learning disabilities in their states with a range from one to 15%. Utah, Washington and Wisconsin employ the definition of the National Advisory Committee in their centers while the remaining five states use the individual State Board of Education definitions. Inspection of the figures for these various definitions used by the CSDP centers also indicate a prevalence range from one to 15%. Incidence figure estimates for each state ranged from one percent as reported by the New Jersey project director to an estimated ten percent as reported by the Mississippi project director.

3. Educational Intervention. Each project director was asked to state the importance and emphasis that the individual CSDP staff gave to several educational approaches using a one to four rating scale.

1. Extremely important--no approach is more basic or more emphasized.
2. Important--emphasized in the program.
3. Used--but not emphasized.
4. Not used even though it may be discussed.

The types of educational approaches included: training motor and/or perceptual motor deficits; modifying behavior by reinforcement to intensify

Table I

Prevalence Figures given by CSDP Project Directors

State	National Advisory Definition	Definition employed by CSDP Center	Incidence Figures For That State
California	1 - 3 %	2%	Not Available
Colorado	5 - 7 %	3%	6%
Mississippi	10 %	10%	10%
New Jersey	Not Available	1%	1% (23,000) *
Ohio	Not Available	5%	5%
Utah	1 - 3 %	3%	3% (9,000) *
Washington	15 %	15%	7%
Wisconsin	1 - 3 %	2 - 3 %	2%

*Both New Jersey and Utah included an estimate of the number of children with learning disabilities.

involvement in learning; identifying and using strengths whenever possible, etc. A graphic representation of the responses by the project directors to these questions as well as the areas of educational emphasis is presented in Table II.

Inspection of Table II indicates that most of the programs placed a great deal of importance upon "identifying and using learning strengths whenever possible". Both "remedial instruction of specific deficiencies of educational subskills" and "programming instruction in exceptionally small sequential steps" also received priority by most project directors. The exception throughout is the California center which uses but does not emphasize any of these particular approaches. "Corrective work by repeating regular classroom program through individualization" received low priority by almost all project directors.

4. Evaluation Strategies. The CSDP staffs employ evaluation to determine the efficacy of their programs and to make modifications of the programs where necessary before replicating the model elsewhere in the individual states. In some of the projects, the evaluation is to be done by the staff, in others by outside individuals and organizations. The following strategies are taken from the section in each of the eight CSDP proposals on evaluation, but do not necessarily reflect all of the evaluation strategies used during the first year of operation. Financial, educational, and organizational problems not foreseen have necessitated the development of different evaluation techniques for some states. The types of evaluation strategies originally specified were:

(a) formative (on-going throughout duration of the project) evaluation for the purpose of providing feedback to project operators for modifications of specific aspects of the program,

(b) summative (end of project) evaluation for the purpose of determining the extent to which the project objectives were attained,

(c) continuous evaluation of pupils served in the model centers or served by CSDP staff outside the center to determine growth rate of academic performance, and

(d) quantitative evaluation through counting the number of pupils, parents, and classroom teachers served by the model center staffs.

Tests specified to be used were: The Iowa Test of Basic Skills, Wide Range Achievement Test, Gray Oral Reading Test, The Wechsler Intelligence Scale for Children, and The Illinois Test of Psycholinguistic Abilities. Other measurement techniques referred to but not specified were: criterion referencing, systematic record keeping, observation schedules, attitude instruments, task analysis, performance data, and sociometric techniques. Traditional research designs such as pre-post test, post test only, and time series techniques were identified as the methods to be employed in analyzing the data.

5. Replication Strategy. The project applicants were asked to specify in the proposals a strategy for replicating the program in other school districts.

Table II

Education Emphasis of CSDP's

	Utah	N.J.	Calif.	Col.	Ohio	Wis.	Wash.	Miss.
A. Training motor and/or perceptual-motor deficits	3	2	3	2	4	3	1	2
B. Training deficits in underlying psychological or psycholinguistic processes (other than perceptual-motor)	2	2	3	1	3	2	2	2
C. Overcoming emotional blocks to learning	3	3	3	2	3	3	2	3
D. Reducing distractibility by environmental control and structured tasks	2	2	3	2	3	2	1	2
E. Modifying behavior by reinforcement to intensify involvement in learning	2	1	3	2	1	3	1	2
F. Corrective work by repeating regular classroom program through individualization	4	3	3	3	4	3	2	3
G. Remedial instruction of specific dificiencies of educational subskills	2	2	3	1	1	2	1	2
H. Programming instruction in exceptionally small, sequential steps	2	3	3	1	1	2	1	1
I. Identifying and using learning strengths whenever possible	2	1	3	1	1	2	1	1
J. Other (specify) Parent Involvement								2
K. Other								
L. Other								

These replication centers are to be funded through local, state and/or private funds. The replication strategy for each state as described in the individual proposals follows.

California: The multiplication strategy employed by this project includes:

1. The encouragement of district and community self-study.
2. The preparation of a handbook on the operational administration, fiscal and reimbursement aspects of the model, and examples of forms used in the project, to assist other districts adopting the model.
3. Encouragement of visits to the model center.
4. Dissemination of information through a periodic newsletter.
5. Preparation and dissemination of samples of the work of the project via video tape recordings and audio demonstrations.
6. Assistance in standardizing procedures for assessing and recording pupil progress.
7. Maintenance of a roster of districts interested in adopting the model.
8. Encouragement of replication through the use of TV/Radio spot announcements.

Colorado: The first year of this project is viewed as both a planning year and an operational year. During this initial year, two districts will be selected to replicate the model. Each replication district will release a team of four teachers to be trained at the model center for a total of ten weeks. Following this training period the two teams will return to their districts and establish the Model Center program. The Coordinator of the original project will continue to offer assistance to these districts following their training.

In addition, films, videotapes, slides and other media will be packaged by the Rocky Mountain Special Education Instructional Materials Center at Greeley, Colorado. These packages of materials will be disseminated by the Materials Center Staff who will also provide personnel to demonstrate the materials contained in the package.

Mississippi: The replication strategies of the Mississippi Model Center will employ the use of the State Association for Children with Learning Disabilities and the Mississippi Council for Exceptional Children Federation. Also, the State Special Education Instructional Materials Center will alert media and materials centers throughout the state by providing suitable resources and assistance in their local areas; the Southeastern Resources Center will assist the model center by training teachers in the proper use of instructional materials; and the State Education office personnel will disseminate news of the Model Center activities to school districts, child guidance centers, child development centers, physicians, psychologists and parent organizations.

New Jersey: The State Education Agency will aid the Local Education Agency in the adoption of the Model Center's computer-based resource information retrieval systems network. Also, the following agencies indicated their desire to participate in this strategy:

1. National Association of Children with Learning Disabilities.
2. March of Dimes.
3. New Jersey Academy of Pediatrics.
4. Interagency Council for the Handicapped.
5. Morristown Memorial Hospital Child Evaluation Center.
6. Private foundations.

The project staff specified plans to use a consumer-oriented marketing approach in acquainting state personnel with the program. The approach includes training workshops, presentations, and demonstrations of the model at major conventions. The cost-effectiveness and highly adaptable nature of the data communication system is such that multiplication of the program will not necessitate a significant increase in the cost of operating the project.

Ohio: This project will develop a package of materials, strategies, and procedures for use by other regions of the state. The State Foundation Program will disseminate components of the in-service training program to 15 or 20 school districts during the 1973-1974 school year. All applicant school districts will be required to submit plans like those of the training model until all school personnel meet State Certification Standards.

Washington: Teachers from Spokane, Seattle, and Tacoma school districts were selected to participate in the multiplier effect during the first year of operation. These master teachers will work the three districts during the first year of operation, and will spend full time in other districts during the second year. Basically, their activities will be (1) in-service training and (2) sharing of tactical procedures for helping the specific learning-disability child within his regular program placement. "Considering the next two-year funding period for this program, the capabilities for the state office of Special Education to fund the programs, the larger communities, the suburban centers, and rural areas, districts would receive by the end of four years complete coverage in terms of training for regular classroom teachers within the context of how to intervene with the specific learning disabled children."

Wisconsin: Once the effectiveness of the model program has been determined, a number of districts have indicated an interest in adopting the concept within their area during the 1973-74 school year. Statewide replication is possible through provision of 70% state salary support and 30% local education agency salary support.

Utah: The following action steps were proposed by the CSDP to assist in the multiplication of the program throughout the state:

1. Personnel invitations to visit the CSDP will be sent to administrators attending the Annual Administrators Conference in August 1971.
2. Invitations, including a simple brochure describing the function of the model center, will be disseminated to other appropriate personnel within the state.
3. Psychoeducational diagnostic services will be offered to children on a limited basis to other school district personnel interested in replicating the center.
4. Packets of materials and instructions for their use will accompany the diagnostic services.
5. Assistance in selecting competent staff for region model replication will be offered.
6. A four-week summer workshop will be provided to staff employed in replication centers.
7. The model center staff will provide on-site aid to replication districts.

Agreed cooperation between the Utah State Board of Education, the Salt Lake City School District, and school districts with the four regional service centers will aid in bringing about the multiplication of the model.

6. Technical Assistance. The CSDP directors were asked to specify what types of technical assistance they felt would be beneficial to their program. All eight directors requested aid in in-service teacher training and program evaluation. Six CSDP directors asked for help in curriculum guidance and evaluation of the multiplier strategy, and also requested more communication between and among the CSDP staff and the LTI staff on a variety of problems that might be encountered. Five directors requested assistance on the multiplier strategy.

7. Newly funded CSDP. In addition to the eight states funded for the 1971-73 period, fifteen other states have been funded by BEH to establish model centers in 1972-74. They are: Alaska, Arizona, Georgia, Iowa, Kansas, Michigan, Nebraska, New Mexico, Pennsylvania, Puerto Rico, Rhode Island, Texas, Virginia, West Virginia, and Wyoming.

Other Programs funded by USOE

The U.S. Office of Education has in less than one decade created several kinds of innovative centers designed to serve exceptional children. These include: Special Education Instructional Materials Centers, Regional Resource Education Centers, Regional Educational Laboratories, Research and Development Centers, Deaf-Blind Centers, Early Childhood Education Programs, Regional Media Centers, and the Learning Disabilities Model Centers previously discussed. Plans are currently being made for the establishment of a National Center on Educational

Media and Materials for the Handicapped. In addition, BEH has stimulated and supported research and teacher training programs in learning disabilities.

The types of services provided by these centers include diagnosis and treatment of the learning problems of handicapped children, in-service programs for teachers, instruction materials for children, and development and evaluation of materials by the staff at the centers. While many of these programs provide direct service to the learning disabled, the data relating to the amount of service received by children specified as having this handicapping condition is unavailable at this time.

This rapid growth in the expansion of service to handicapped children is not without some problems. A report by a five member panel, published by the Institute for Educational Development, entitled "Planning the Future of the Special Educational Materials Centers and Regional Media Centers" (Brickell, Project Director, 1971), addresses itself to the wide diversity of programs funded by BEH. In establishing these centers:

> . . . BEH has displayed considerable ingenuity and alert responsiveness to the needs of the field. In assigning missions to the various units, however--sometimes because of legislative mandates and sometimes for other reasons--BEH has allowed overlaps, gaps, and occasional duplication of effort. The results of this half decade of organizational invention in an impressive array of organizations. It is something less than a system--an imaginative but not patterned collection of administrative units. It is as though some pieces of a giant puzzle have been carved out and set in place before the puzzle itself has been designed. Thus, the missing pieces cannot be shaped with a sure hand (p. I-1).

This problem may be due to the large number of centers, the diversity of goals, the current level of development and refinement of these programs, and the need for the centers to fit into the pre-existing educational structure. In addition, the relatively small staff at USOE/BEH precludes in many cases the intense interaction with these centers which may be necessary to provide a complete cohesive national package of service to handicapped children.

Summary

The results of this analysis of federal action indicates that the U.S. Office of Education has funded a variety of programs to provide service to handicapped children. Specific to learning disabilities, the legislative mandate and appropriations of Public Law 91-230, Title VI, Part G, has enabled BEH to fund 23 State Educational Agencies to develop model Child Service Demonstration Program Centers. These centers, after rigorous evaluation and refinement, are to serve as models in stimulating service to the learning disabled in the 23 states. The LTI in Learning Disabilities has also been funded to aid the staffs at the model centers in evaluation, refinement, and replication.

ACTION AT THE STATE LEVEL

There are several problems encountered when attempting to analyze the current level of services to learning disabled children in each state. These difficulties include: (1) the variability and application from state to state of laws and regulations, (2) the wide diversity in funding of programs for learning disabled children from federal, state, local and private agencies, (3) the difficulty in collecting current information from State Boards of Education, (4) the uncertainity regarding the population to be served, and (5) the recent development, rapid growth, and expansion of services to the learning disabled. Despite these problems there is need for an accurate reading of the existing state of affairs in each state in order to systematically channel available resources into areas of weakness.

In describing the current status of service arrangements in each State, several surveys and publications were located and analyzed. In addition, information was received by the LTI from thirty-six State Departments of Education concerning activities relating to the provision of service for learning disabled children. This data was compiled and is presented in Table III.

The information contained in this table is in many cases incomplete and in some instances probably obsolete. However, this data does represent some general activities, and also strongly indicates the need for a systematic on-going collection of data from each state. The following discussion is taken from the chart and is divided into: (1) laws and definitions, (2) incidence, (3) number of pupils being served, (4) age-range of pupils as mandated by law, (5) method of certification of disabilities, and (6) education programs. A summary is presented following the individual discussions.

Laws and Definitions

Laws are one mechanism whereby those pupils with learning disabilities can be provided with educational opportunity. In a recent publication by CEC State-Federal Information Clearinghouse (Weintraub, ed., 1970), eighteen states having legislation specific to children with learning disabilities were discussed. This publication points out that it is impossible to accurately assess the status of law in the fifty states at any given time as laws are constantly undergoing change. In addition, laws are viewed as only one of the resources necessary for educational opportunity and their existence does not necessarily indicate that services are actually available.

> . . . in some states learning disabled children are receiving services when no specific provision is made for them within the law. For example, some states provide for all exceptional children under an umbrella law which does not specifically mention learning disabled children. Other states have through administrative fiat extended services to the learning disabled child by broadening the legal labels, "crippled," "maladjusted," or "health impaired." The laws of the states utilizing such an approach are not contained within this report. However,

TABLE III

STATE PROGRAMS FOR THE LEARNING DISABLED

State	Laws & Definition	Incidence	Number Served	Age Range	Certification of Disabilities			Education Program					
					Team	Psych	Medical	RS	SS	DS	CC	RR	I**
Alabama	Excep. Child	13,760	550	7-21	X					X	X	X	
Alaska	Own	300-400		7-16		X							
Arizona	Own	1%	1,202		X								
Arkansas	Excep. Child		722	2.5-18	X				X	X		X	X
California	Educ. Handicap	23,773		6-20	X					X		X	
Colorado	Educ. Handicap	3%	16,000	5-21	X								
Connecticut	Excep. Child	8,000	1,290		X					X	X	X	X
Delaware	Own	1,900		7-	X				X	X	X	X	X
Florida	Excep. Child	(1%)14,110	7,000	3-21	X				X	X		X	
Georgia	Dyslexic	(1%)12,443	1,598	7-16						X			
Hawaii		1,194	539	3-20			X		X	X			
Idaho	Excep. Child		92	6-20						X			
Illinois			2,762	5-21	X					X			

**See key at end of table.

State	Laws & Definition	Incidence	Number Served	Age Range	Certification of Disabilities			Education Program					
					Team	Psych	Medical	RS	SS	DS	CC	RR	I**
Indiana		1-3%	601		X					X			
Iowa	Excep. Child	26,209	1,640	5-18	X					X		X	X
Kansas		(5%)1,000	379	6-21	X			X		X		X	X
Kentucky	Nat. Adv. Def.	15-20	314	6-21						X			
Louisana	Excep. Child		561	3-21	X					X			
Maine		(10-15%)33,000	350	5-20	X								
Maryland			3,505	4-21						X			
Massachusetts	Excep. Child		1,920	6-21	X				X	X		X	X
Michigan													
Minnesota		20-40,000	24,000	-21									
Mississippi			400		X								
Missouri			575	6-21						X			
Montana													
Nebraska				5-17						X			
Nevada	Neuro. Disorders				X								
New Hampshire				5-18					X				

**See key at end of table.

State	Laws & Definition	Incidence	Number Served	Age Range	Certification of Disabilities			Education Program					
					Team	Psych	Medical	RS	SS	DS	CC	RR	I**
New Jersey	Handicap Child	(5%)60,000		5-20	X								
New Mexico	Neurological		60		X					X			
New York													
North Carolina		3%	1,500										
North Dakota			276	6-18								X	
Ohio		2%	12,630	6-21									
Oklahoma	Excep. Child	9,773	301	6-21						X			
Oregon	Handicap Child		5,140	6-14	X								
Pennsylvania													
Rhode Island		11,330	400										
South Carolina	Nat. Adv. Def.		187	1-18	X			X		X			
South Dakota		560	34	7-13	X			X					
Tennessee			692	5-21						X			
Texas	Own		13,780										
Utah			9,281	6-22	X						X		
Vermont		4%	1,171	4-20				X	X	X		X	X

**See key at end of table.

State	Laws & Definition	Incidence	Number Served	Age Range	Certification Disabilities			Education Program					
					Team	Psych	Medical	RS	SS	DS	CC	RR	I**
Virginia		3%	248	6-18	X					X			
Washington	Handicap Child												
West Virginia	Excep. Child												
Wisconsin			223	1-20									
Wyoming			900										
Puerto Rico													

**Key

RS - Residential Special Class
SS - Special Schools
DS - Day Special Class
CC - Cooperative Class
RR - Resource Room
I - Itinerant

> the reader should not see such approaches as undesirable. It is the belief of the State-Federal Information Clearinghouse for Exceptional Children that laws should be tailored to the unique needs of the particular state, and in such cases the lack of specific learning disabilities legislation may be perfectly valid. The reader should not construe a correlation between law and program. There are states with no specific learning disabilities legislation which are operating extensive programs; while on the other hand, some states with extensive laws have had very little limited program development (p.3.).

However, the laws within each state relating to exceptional children do allow for the classification of students and programs as well as facilitate administration, financing, and supervision. Where laws do not exist there have been instances where states have funded programs for the learning disabled under other categories of handicaps. For example, Rogan and Lukens (Haring, ed, 1968) surveyed 212 administrators throughout the nation on the question of legal terminology used in providing services to learning disabled children. The findings reported were:

> . . . 72 (34 percent) of the programs for children with learning disabilities were classified as programs for the physically handicapped, 66 (31 percent) were classified as educationally handicapped, and eight (4 percent) as emotionally disturbed. The remaining 66 programs were reported to be classified in more than one legal category or in a new category. Examples of new categories were neurological impaired, brain injured, perceptually handicapped, learning disorders, multiple handicap, and varying disabilities (p. 23).

Funds to finance these programs were derived from state and local special education funds, general education funds, federal funds, private foundations, or special taxes. However, this data was gathered approximately four years ago and was not totally representative of all services across the country to the learning disabled.

More recently, the Council for Exceptional Children (Trudeau, ed., 1971), published a digest of federal and state laws relating to the education of handicapped children. The laws and definitions, as noted in Table III, were taken from this publication and include only those state laws which mention learning disabilities specifically. Inspection of this table indicates that only Delaware, Kentucky, and South Carolina specify the definition reported by the National Advisory Committee on Handicapped Children (1968). Nine states employ the use of the exceptional children definition which includes pupils with learning disabilities. One definition of this type is presented:

> Exceptional children means persons between the ages of six and 21 who have been certified under regulations of the state board of education by specialists as being unsuited for enrollment in regular classes of the pupil schools or who are unable to be educated or trained adequately in such regular programs including but not limited to the mild

> and moderately to severely retarded, but not including the profoundly retarded; the speech impaired, the deaf and hearing impaired, the blind and vision impaired; the crippled and those having other physical handicaps not otherwise specifically mentioned herein. The emotionally conflicted; the socially maladjusted; those with special learning disabilities; the multiply handicapped, and the intellectually gifted (Alabama) (p. 1-1).

Other more specific definitions include:

> Children with learning disabilities includes those who exhibit disorders in one or more of the basic learning processes involved in comprehending or using expressive or receptive language and who may require special facilities, equipment, or methods to make their educational program effective (Alaska) (p. 2-1).
>
> 'Specific learning disabilities' means the condition of a child who exhibits a significant discrepancy between ability and achievement as determined by an evaluation pursuant to Section 15-1013. The specific learning disability may be manifested by perceptual handicaps, brain injury, minimum brain dysfunction, dyslexia, developmental aphasia, but excluding learning problems which are due primarily to visual, learning or motor handicaps, mental retardation, emotional disturbance, or due to environmental disadvantage (Arizona) (pp. 3-1,2).
>
> Language and/or learning disabled children means children who are so deficient in the acquisition of language and/or learning skills including, but not limited to, the ability to reason, think, read, write, spell, or to make mathematical calculations, as identified by educational and/or psychological and/or medical diagnosis, that they must be provided special services for educational progress. The term 'language and/or learning disabled children' shall also apply to children diagnosed as having specific developmental dyslexia (Texas) (p. 43-1).
>
> Handicapped children are those children in or out of school who are temporarily or permanently retarded in normal educational processes by reason of physical or mental handicap, or by reason of emotional maladjustment or by reason of other handicap and those children who have specific learning and language disabilities resulting from perceptual-motor handicaps, learning problems, and visual and auditory perception and integration (Washington) (p. 47-1).
>
> . . . 'handicapped child' includes any child who is mentally retarded, visually handicapped, auditorily handicapped, communication handicapped, neurological or perceptually impaired, orthopedically handicapped, chronically ill, emotionally disturbed, socially maladjusted, and multiple handicapped (New Jersey) (p. 30-1).

> 'Educationally handicapped minors' are minors other than physically handicapped minors (as defined in Sections 6801 and 6802 of this code) or mentally retarded minors (as defined in Section 690, 6902, and 6903 of this code) who by recisions of marked learning or behavioral problems, or a combination thereof, cannot receive the reasonable benefit of ordinary educational facilities (California) (p. 5-2).
>
> 'Educationally handicapped children' means those persons between the ages of five and 21 years, who are emotionally handicapped or perceptually handicapped, or both, and who require special education programs (Colorado) (p. 6-2).
>
> A 'socially or emotionally maladjusted child' or 'neurologically impaired child' is one who is incapable of profiting from the general education programs of the public schools because of some serious social or emotional handicap or an impairment of the nervous system, respectively as defined by regulations of the state board of education, but who're expected to profit from special education, 'learning disabilities', 'extraordinary learning ability' and 'outstanding creative talent' shall be defined by regulations of the secretary, subject to the approval of the state board of education, after consideration by him of the opinions of appropriate specialists and of the normal range of ability and rate of progress of children in the Connecticut public schools, Connecticut to make their educational program effective (Connecticut) (pp. 7-1,2).

The Georgia law does not mention children with learning disabilities but includes in their definition the dyslexic. Idaho specifies children who have perceptual, visual or auditory handicaps. Nevada includes in their definition of handicapped minors those pupils who exhibit neurological disorder. Neurological or other health impaired is included in the New Mexico definition of handicapped children. Oregon used the term extreme learning problems in their definition, while Tennessee employs the term "psychologically exceptional." For a complete listing of the laws and guidelines the reader is referred to the CEC Digest.

While some states do not have laws specifically relating to educational programming for learning disabled children, all do have laws pertaining to special education programming in general. In most instances, these laws are written in such a way as to provide the State Education Agency with the latitude to develop rules and regulations which provide for the development and maintenance of a wide variety of special education programs, which could include programs for children with learning disabilities. This approach in developing appropriate rules and regulations without the necessity of involving the entire legislative process has obvious appeal to educators and legislators alike.

In summary, the presence of laws which include and/or define the learning disabled population do not in themselves guarantee that educational services are being provided to pupils with this handicapping condition. Administrative fiat through the manipulation of rules and regulations governing the provision of services to handicapped children are methods that can and are being employed in some states.

Incidence Figures

The National Center for Educational Statistics, Educational Manpower Branch, U.S. Office of Education (Silverman and Metz, 1970) conducted a national survey of the members of pupils with specific learning disabilities. The procedure for gathering the data in this survey was a questionnaire to principals throughout the nation requesting information concerning the number of children enrolled in the school who could be identified as having specific learning disabilities. The results indicated that 1,160,000 pupils (2.6 percent) of the 45,102,000 pupils enrolled in the sampled schools in fifty states and the District of Columbia were designated as having this handicapping condition. However, the ability and level of expertise of the principals surveyed in identifying learning disabilities make these incidence figures somewhat questionable.

The difficulty of interpreting incidence figures within each state is further reported by Operations Research Inc. (ORI), (Mintz, Project Director, 1970). ORI was funded by the Bureau of Education for the Handicapped, USOE to develop an operational model which would permit an organized consideration of the factors affecting the requirements for special education manpower, to make a projection of these requirements, and to determine the manpower gap through a comparison with the supply potential. The model concept was developed and tested and is viewed as feasible as well as necessary. However, a conclusion of this study was that states lack the comprehensive diagnostic capability to estimate prevelance rate and therefore apply the national prevalence rates or modifications of the national rates. Some few states, however, do conduct special studies to determine prevalence estimates.

Information relating to Table III on incidence figures were obtained from the ORI report and from information received by the LTI staff throughout the year. Where percentage figures were given the range was from two percent (Ohio) to five percent (New Jersey). Where numbers were reported the range was from 560 (South Dakota) to 60,000 (New Jersey). In some cases the incidence figures are over two years old and no specific information was found which indicated how these figures were derived. They should, therefore, be viewed very cautiously.

The difficulty in deriving incidence figures is due in part to the lack of comprehensive diagnostic capability within each state for such a task. Incidence figures, therefore, are usually impressions from teachers, administrators, etc., or national estimates applied to the total school population within a state. These figures should therefore be viewed as estimates rather than as a true indication of actual incidence. Compounding this difficulty is the uncertainty and variability that currently exists concerning the characteristics of the learning disabled.

Number Served

ORI (Muntz, Project Director, 1970) also addressed itself to the number of children being served as well as incidence figures previously discussed. The conclusion resulting from this part of the ORI study was that the data derived was not inclusive of all the sources of educational services, i.e., public schools, state schools and institutions, and private facilities. In most cases, each agency maintains its own records and this information may not be available from the State Department of Education. Contained in this report is the following statement:

> ... interagency cooperation and communication are absolutely essential to the establishment of a common handicapped child data base that will be representative of the state's total service requirements and responsive to each agencies information needs (p. xiii).

It is further suggested that the internal coordination and communication within each special education agency be strengthened and that standardized reporting forms, data collection cycles, and time-tables be developed and maintained.

In the survey by the National Center for Educational Statistics (Silverman and Metz, 1970) of principals throughout the country, 648,000 pupils (1.4 percent of all pupils) were receiving specialized instruction. In this same survey 2.6 percent were designated as having learning disabilities by the principals, leaving a discrepancy of 1.2 percent of the identified population needing, but not receiving, special education.

Information concerning the number of pupils served as reported in Table III is taken from the ORI Report and information received by the LTI Staff throughout the year. The range is from 34 children (South Dakota) to 16,000 children (Colorado). Inspection of this table by comparing incidence figures to numbers being served where given, indicates that in most states there is a real need for expansion of service to the learning disabled. Further investigation needs to be undertaken in those states where figures are unavailable and also need exists for a more accurate and current reading of the figures of many of the states that report incidence and numbers being served.

Age Range

In a survey by Rogan and Lukens (Haring, ed., 1968) the chronological age range of pupils with learning disability receiving service were from five to 19 years of age. The services at the junior and senior high school level suggested tutorial or small group remedial programs. The greatest concentration of service, however, was at the six to 12 year old levels.

The age ranges presented in Table III were for the most part, taken from the Digest of State and Federal Laws: Education of Handicapped Children (Trudeau, ed., 1971). The ranges specified in the legislation vary from state to state but in some cases are from birth to 21 year (Minnesota) orfrom seven to no specified age ceiling (Delaware). These age ranges , of course, do not indicate that pupils who fall within the category and who have learning disabilities are receiving service.

Certification of Disabilities

Questions concerning the certification of learning disabilities in children have been posed by Rogan and Lukens (Haring, ed., 1968).

> Should placement be based on (1) medical psychological diagnosis, including etiology, (2) psychoeducational assessment, indicating areas of deficit, (3) achievement failures in specific areas of skills such as reading and arithmetic, or (4) social adjustment (p. 28).

Bateman and Schiefelbush (Haring, ed., 1968) recommend that the purpose of diagnosis should be to plan remediation and that essential to the assessment of children with learning disabilities is the need for continued clarification and improvement of communication and working relationships among the various disciplines.

In Table III, most states reported that a handicapping condition was certified by a team of experts without specifying the various disciplines that are represented in this assessment strategy. Hawaii states that "Children having emotional or intellectual handicaps must be evaluated by a licensed physician eligible for membership in the state medical society (Trudeau, ed., 1971, p. 11-1)." In many states, the responsibility for certification of disabilities rested with the State Board of Education, State Superintendent, Board of Trustees, or the Director of Special Education. Specific information on how certification of disabilities is actually determined in each state was not located.

Educational Program

The type of educational program for pupils with learning disabilities can include residential special classes, special schools, day special classes, cooperative classes, resource rooms, or itinerant service. Rogan and Lukens (Haring, ed., 1968) reported in their survey that:

> The majority of teachers (58 percent, 377 of 651 responding) reported that the length of time spent during the day with their pupils was essentially a full school day ranging from four and one-half to six hours in length. Ninety-two teachers (14 percent) indicated that they offer less than one hour per day of special service to each child. Most of the replies indicated that some children in a group spend a portion of the school day, ranging from one-half hour to more than three hours, in the regular classroom. Almost one-half of the reports (40 percent) indicated that children in a group might spend half of the school day on more in the regular classroom (p. 25).

Information presented in Table III was taken from the ORI Report (Muntz, Project Director, 1970) plus that gathered by the LTI staff from State Departments of Education. By far, the Day Special Class was indicated as the placement of choice for implementing the educational program. However, the information obtained by the LTI staff, and more current than that derived from the ORI Report, indicated that the resource room approach is more popular in the 36 states surveyed.

Summary

Problems that were encountered in gathering specific and current data from each state regarding the provision of services to learning disabled children were discussed in this section. These problems included: (1) the apparent lack in many cases of a formalized efficient information exchange mechanism for recording the current level of services to children with learning disabilities, (2) the methodological difficulties inherent in determining the number of children needing service, (3) the variability concerning laws and their implementation, (4) the uncertainity regarding the exact characteristics of learning disabled youngsters, and (5) the recent development and rapid expansion of services to pupils with this handicapping condition. Despite these problems, it is safe to assume that many children with learning disabilities are not receiving special education instruction.

In addition to the areas delineated and discussed in this section, other data concerning services in each state to pupils with learning disabilities would also be useful. These include: (1) the amount of monies expended by each state for educational programs for learning disabled children, (2) the relationship between existing state and locally funded programs to federally funded programs, (3) the evaluation strategies employed by each state to determine the efficacy of their practices, and (4) the future plans of each state concerning this population of exceptional children. A comprehensive picture of these activities would provide alternatives and directions to others interested in establishing programs. More importantly, systematic long range plans could be developed to insure that children with learning disabilities will be appropriately provided for in the public schools.

FACTORS RELATING TO SERVICE ARRANGEMENTS

The longevity of the development of special education in the public schools remains well under a hundred years and the emphasis for dealing with handicapped children has undergone many revisions. Today more children are being served with a variety of special education services than in the past but there are still many places where special services are unavailable, particularly for the mildly handicapped child and the learning disabled child. Dunn (1963) reported that during the 1957-58 school year, only thirty-one percent of those children needing special education were receiving it in the public schools. Mackie (1965) has stated that the percentage of children requiring special education in relation to those receiving it varies considerably from one area of exceptionality to another. About one-half of the children who were speech handicapped or visually impaired had access to special education programs, whereas only about eight percent of the severely emotionally disturbed and socially maladjusted received special education services. She also reported that only one-third of the mentally retarded were in special classes.

Special services to the learning disabled have only received widespread interest within the last decade. The difficulty in determining even an approximation of the number of pupils receiving service or the number of pupils with this handicapping condition who presently need service was discussed in previous sections of this report. The problems encountered in gathering information concerning grants and awards that might focus upon service to the learning disabled, as well as incomplete data within and from the individual states contribute to the problem of determining the present level of service. Also the variety of definitions employed and the variability of the criterion measures that may be used to designate pupils with this handicapping condition, contribute to the difficulty of determining the number of pupils who might require special services. Despite these problems, the fact remains that some learning disabilities students are receiving services and that the federal government and state governments (for the most part) have enacted legislation or have flexible enough legislation to provide for this population. Therefore, the purpose of this section is to discuss extending the quantity of services as well as improving the quality of services to the learning disabled. Inherent in this discussion is the belief that the educational system can be coordinated to achieve efficient and effective delivery systems to pupils with this handicapping condition.

This section includes: (1) an organizational view of the field of learning disabilities, (2) some current trends which may have an effect on learning-disability practices, (3) a discussion of some management techniques, and (4) a summary of these discussions.

Organizational View of the Field of Learning Disabilities

The field of learning disabilities is extremely complex with roles and responsibilities of professionals varying from locale to locale. However, there does exist certain institutionalized organizations that can be examined in relation to service to children with learning disabilities. This section presents the rationale for the development of an institution framework, and a discussion of each component of that framework.

Havelock (1971) has provided a framework for understanding the process of innovation, dissemination, and knowledge utilization as it relates to the institutionalized educational organizations. He contends that it is this institutional framework which largely determines what actually happens in education and delineates some problems that exist in coordinating the activities of the various institutions.

Havelock views the individual institutions as important and relevant in our understanding of the entire educational framework and has identified eight major subsystems of the total educational system. They are: (1) the universities, (2) the scientific profession, (3) the practice profession, (4) the product organizations, (5) the service organizations, (6) the consumer organizations, (7) the government, and (8) the media.

The following definitions of these subsystems are taken from Havelock's report. The reader is referred to the original work for a more detailed description.

The University Organization. ". . . the university is the primary source, storage point, and cultural carrier of expert knowledge in all fields, basic and applied (Havelock, 1971, p. 3-2)."

The Scientific Profession. The scientific profession is usually a group of university-based scientists concerned with the generation or affirmation of knowledge.

The Practice Profession. The practice profession is made up of the teachers in the schools who implement the knowledge stored in the universities and developed by the scientists.

The Product Organization. The product organizations are responsible for the development of textbooks, equipment and educational facilities.

The Service Organizations. The schools are the primary service organization of education and are almost virtually the only mechanism employed to transfer knowledge to pupils.

The Consumer Organizations. The consumers in this educational framework are the pupils in the schools. This is the largest and most diffuse subsystem within the framework.

The Government Organization. The whole of this system is usually mediated by the government. The government usually has some influence upon all the organizations and can insure that all serve a common purpose.

The Media Organization. The media represents a direct method of influencing members of the system as well as the general public and aids in information transferring from researchers and experts of various sorts to the great majority of consumers.

Havelock states that there is little understanding among these various subsystems regarding their mutual relatedness and interdependence. He suggests that the subsystems need to be continuously exchanging ideas in order to facilitate coherent planning and coordinating of activities.

Utilizing Havelock's framework, a graphic representation of the major organizations and professions which influence services to children with learning disabilities was prepared and is presented in Figure I. This chart modifies Havelock's original eight subsystems through the inclusion of "organizations and factors which influence the provision of services." "Service organizations" in this chart refers to government funded task forces, special study institutes, service centers, etc. The "service profession" includes administrators and teachers in school systems, while "instructional settings" refers to specific settings in which learning disabled pupils receive educational aid.

Each of the organizations and professions will be discussed in detail. Of course, individuals may belong to more than one professional group or organization. For example, a person might perform the role of teacher trainer in the university; he might also be a member of the scientific profession concerned with the generation and affirmation of knowledge through research; he might also be a consultant to the government. In other cases, a person might be an employee of the government but previous to assuming this position might have been a member of the university profession or service profession. This movement of personnel within the organizations and professions allows for an informal information exchange mechanism.

It must be remembered, however, that this chart is an approximation of the true picture. The field of special education is extremely complex and interaction and roles of the professionals operating in this field vary from locale to locale. However, by identifying each of these major organizations and professions within the educational framework, it is possible to critically examine each in relation to administrative and service arrangements to the learning disabled.

Organizations and Factors which Influence Service

Chalfant (1967) became interested in why public schools administrative units have provided for less than one-third of the children needing these services and set out to develop a diagnostic technique to indicate whether or not specific counties in Illinois could be expected to provide special education services.

His research focused upon the economic and demographic variables and their relationship to public school provisions for children who are deaf, speech handicapped, or educable mentally retarded (p. 45)." Also studied in relation to economic and demographic variables were the provision of administrative and supervisory service for special education programs. Six factors were identified in this study as relating to whether or not a particular school district would have special education services of the types mentioned.

The factors were: (1) urban factors, (2) educational factors, (3) socio-economic factors, (4) rural occupation factors, (5) financial ability factors, (6) population growth factors.

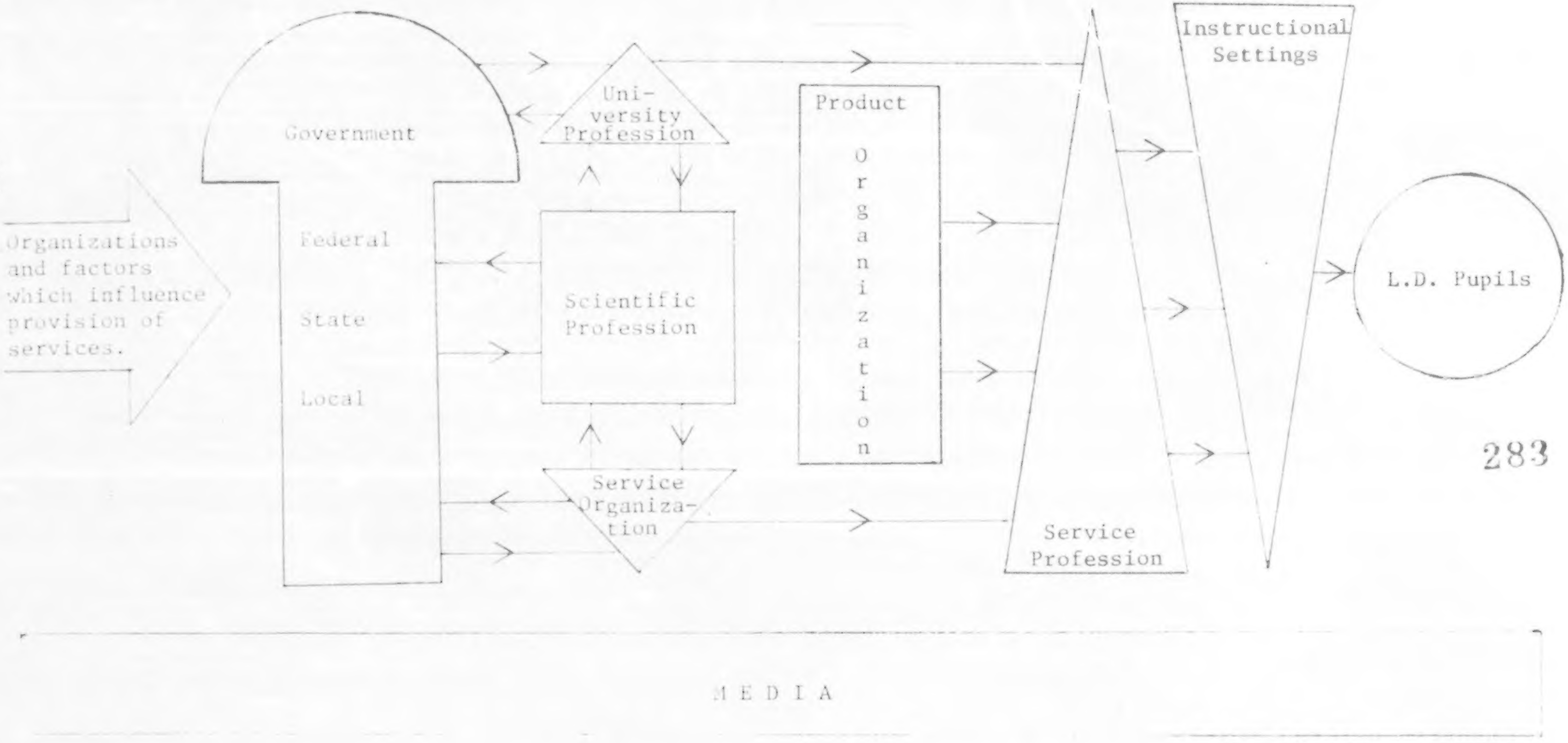
Chalfant reported that:

> The urban factor, which accounted for 44 percent of the variance, was the strongest factor. This factor was composed

Figure I

ORGANIZATIONS WHICH INFLUENCE

SERVICE TO THE LEARNING DISABLED


Organizations and factors which influence provision of services.
Government
Federal
State
Local
Uni-versity Profession
Scientific Profession
Service Organiza-tion
Product Organization
Service Profession
Instructional Settings
L.D. Pupils
MEDIA

> of variables that typically describe urban areas, such as population density, large numbers of children in average daily attendance, high family income, high education level, and a large proportion of the labor force engaged in manufacturing or white collar occupations (p. 47).

This conclusion was not surprising since a large population base is in most cases necessary to provide sufficient numbers of children to establish special programs. The educational factor, although not found to be nearly as strong as the urban factor, certainly has a major implication for the development of special programs. A well educated population will probably place a higher priority on the value of a sound education than might a poorly educated population.

Although Chalfant's work was used with different populations of children, such factors as he found can also be assumed to relate somewhat to the existence or non-existence of education programs for children with learning disabilities as well. Perhaps, because their handicap is in many cases less obvious and therefore more difficult to diagnose, they are not going to be identified as needing services as quickly as the deaf, speech impaired, and the mentally retarded. Because of this, major factors, such as those which are influenced by urbanization, may still not increase the diagnosed population (dependent upon the interpretation of the definition employed) to such an extent that services are efficient and economical in some public school districts. Perhaps, more important to the provision of services for the learning disabled child at this time are the educational factors Chalfant defined. Parents from higher educated populations are more acquainted with learning disabilities as a handicapping condition and find this label more acceptable and perhaps more honest for their children than the "educable mentally retarded" or the "brain injured" stigmas of the past.

The effect parents have had in the development of special education services is quite apparent in the area learning disabilities. A national parent organization, known as the Association for Children with Learning Disabilities (ACLD), was formed in 1964. Members of ACLD have been particularly helpful in influencing legislators to provide financial support for the education of children with learning disabilities. Annual conferences held by ACLD have been popular with parents, teachers, administrators, etc. and have provided an arena for concerned people to exchange information and give direction to the future.

In 1968, the Division for Children with Learning Disabilities (DCLD) was organized within the Council for Exceptional Children (CEC). The purpose of this organization is similar to that of ACLD, i.e., to promote the education and general well-being of children with this handicapping condition. Both ACLD and DCLD are powerful tools in influencing the government to provide service for the children with learning disabilities.

In conclusion, some factors and organizations have been identified which have influence upon the development of service arrangements for handicapped children. Factors such as urbanization and educational level of parents have been noted as relating to the support of special education services. Relative to this point, services do need to be extended in large metropolitan areas and to children of educated parents, but attention must also be directed toward providing service to learning disabled children in sparsely populated areas as well as to children of poorly educated parents. The organizations of ACLD and DCLD can be mechanisms used for influencing the government to provide services for the learning disabled in all segments of society.

Government

The federal, state and local governments provide financial appropriation to education, particularly when pressure is exerted by a demanding public. Havelock (1971) states that the government usually participates in fulfilling several responsibilities. Many of these responsibilities are carried out by government officials or they may be delegated to other agencies or individuals.

The best government performs ten specific functions to some degree with the goals being toward a system which is self-supporting, self-protecting and self-controlling but is still coordinated toward the common good. The following ten functions, according to Havelock, are geared toward the "ideal" rather than the "actual."

1. *Planning*. The government usually has the responsibility for future action through the process of funnelling money into certain types of activities. This is accomplished within the guidelines as specified by the laws.

2. *Design*. Where planning reveals areas where change appears desirable or where experimental innovation seems necessary, the government is usually called upon to develop designs and prototypes.

3. *Installation*. Installing the changes that are regarded as necessary into the existing system is an important task of the government. The innovation must be installed in such a manner as to not be rejected by preexisting subsystems.

4. *Support*. Financial support must be allocated and distributed to the various subsystems. This pattern of support allows the government some measure of control and coordination ability.

5. *Facilitation*. The government must assume the positive role of helper and facilitator of each subsystem. This usually takes the form of awards and grants in the form of centers, curriculum development, conferences, research, training programs, etc.

6. *Coordination*. The government must develop communication and reciprocal interaction among the subsystems so that each subsystem performs tasks which are complementary but do not overlap the tasks of others.

7. *Evaluation*. The current level of performance of each subsystem needs to be measured and assessed so that rational decisions can be made concerning the system in relationship to change.

8. *Monitoring*. Evaluation is depending upon information concerning the activities of various subsystems. Good government requires an accurate reading of the state of affairs.

9. *Protection*. Government is changed with the obligation of protecting the members of the subsystems from intrusion or violation of their integrity. Maintenance of standards, privacy, safety and security are subsumed under this function.

10. *Control*. All of the nine functions listed here can be viewed as methods of control.

The role of government in affecting the improvement of services to children through control cannot be overlooked. Umans (1971) states in regard to federal aid to education:

> Federal aid to education now equals approximately 25% of the total amount invested by the states. Each of the programs has strings attached. In some programs, the money must be spent only on the poor; in others, only for innovation, or for the handicapped, and so on. Each federal program is concerned with a purpose--to change education for segments of our population. There are those who deplore federal aid because of these 'controls' but it is there very controls that effect change. Federal aid to education must therefore be considered as a serious and powerful tool for effecting changes (p. 30).

The federal government and, in most cases, the state governments are planning, designing, installing, supporting, and facilitating programs for the learning disabled. Getting a clear picture of the extent, content, and direction of this activities remains unclear. However, it is clear that many pupils with this handicapping condition are not receiving educational support. Continued effort is necessary and assurance that energy and resources to the learning disabled will continue and expand depends to a great extent upon parent and professional demands voiced to government officials.

Relating to government activities for the learning disabled, coordination, evaluation and monitoring of the subsystems deserves more attention. Of particular importance is the need for an accurate reading of the existing state of affairs. This would require a massive effort but would allow for a systematic analysis of the strengths and weaknesses of the total system as well as facilitate rational planning. Also, coordination of the various subsystems needs to be formalized, evaluated, and appropriate and honest feedback mechanisms need to be developed.

Service Organizations

The service organizations in learning disabilities/special education discussed here are limited to those funded by BEH/USOE. In some cases, they share responsibilities with the federal government on the ten specific functions discussed previously. These service organizations include:

1. The Leadership Training Institute in Learning Disabilities. One of the purposes of the LTI is to provide technical assistance to the State Child Service Demonstration Centers which has been discussed in the section on federal assistance. The LTI performs the role of supporter and facilitator of the centers by providing coordination and information to the center's staff concerning alternative practices that can be utilized by the individual CSDP's. In addition, the LTI was charged for the year 1971-72 to prepare this document on the current status of learning disabilities.

2. Regional Resource Centers. Public Law 91-230, Title VI, Part C, 1969, allowed BEH/USOE to fund six regional centers in Iowa, New Mexico, New York, Oregon, Pennsylvania and Utah. The purpose of these centers is to serve as resources to institutions, agencies, and schools, children, parents, and

teachers. These centers provide in-service education to teachers, diagnostic and treatment services to handicapped children, and develop and evaluate alternative service systems to children.

3. Special Education Instruction Materials Centers (IMC). The Instruction Materials Centers provide teaching materials and related services to teachers of handicapped children.

Members of these three service organizations interact regularly with members of the funding agency, USOE. They also employ members of the university, scientific, and service professions as consultants and advisors to their programs. They provide direct service to administrators and teachers in the service profession and also to the children served by these professionals.

As the LTI, the RRC's and the IMC's are in the initial stages of development, their efficacy has yet to be determined. They should, however, be considered as potentially viable organizations to meet the needs of the learning disabled population.

Scientific Profession

Many members of this organization are housed in the university but some are also housed in research units or in the service profession. In learning disabilities, scientists concerned with this group of children are from a variety of departments or fields of study such as speech, reading, psychology, medicine, etc. Due to this factor it is often difficult to pull together all the knowledge concerning the population studied as these professionals are not members of a common scientific organization. These interaction with the field is usually limited to the university profession and the government for research subsidy. For example, the Division of Research in BEH funds professionals to perform research activities and may also employ some of these scientists to aid in policy making. However, because of the diversity of backgrounds of the various individual members of this profession it is difficult to have the level of information exchange necessary for establishing a systematic program of research efforts with the learning disabled population. The reader is referred to the section on research on subject, treatment, and content variables for more information concerning the activities of these professionals.

The University

Professionals housed in universities serve as "experts" concerning their area of study, train teachers, and/or do research. They interact with other members of the subsystems in a variety of capacities. Some of these include:

1. They receive funds from state and/or federal government, unless privately endowed, to train teachers; they serve in a planning, advisory or consultant capacity to the government; or they may be funded to perform one of the ten roles of the government previously delineated.

2. Many university professionals are members of the scientific community involved in research concerning the learning disabled.

3. These professionals use the product organizations to publish textbooks and instructional materials.

4. They serve as consultants or members of the service organizations.

5. University staff train members of the service profession either through pre-service teacher preparation and staff development or in-service training.

6. Clinics may be housed in universities that provide direct diagnostic and instruction to the learning disabled. These clinics are also used to provide training to teachers under supervision of the university personnel.

Overall, university learning disability staff interact more intensely with all systems in the framework than members of any other subsystem. For this reason, these professionals can provide a great deal of coordination of the entire field (Havelock, 1971). For a description of the training activities of these professionals the reader is referred to that section in this final report.

Product Organization

The product organizations are responsible for materials used by the individuals within the system. The university and service professions use textbooks, usually written by members of their own professional groups, published by this organization. The service profession also relies heavily upon the product organizations for instructional materials. Havelock (1971) states that product organizations are: (1) historically and structurally isolated from the mainstream of scientific knowledge, (2) are in the business for financial profits and use the media for advertising and promoting their products, and (3) the consumer (service profession) of their products has the right of choice in selecting products as this is an open competitive market. He states that the open and competitive market is actually not realized as the result of the product organizations' ability to package, advertise, finance and price products which preclude fair value comparison. The reader is referred to the survey in this final report of the product organization in learning disabilities.

The Service Profession

This profession is comprised of administrators and teachers who rely upon the government, universities, scientific communities, product organization, and more recently the service organization for funds, training, information, content and techniques for teaching. As they reside closer to the direct service to children these professionals can provide, given an adequate feedback mechanism, a strong force for maintaining the relevancy of the activities of all the other subsystems. The training and certification of members of this profession is discussed in the teacher training paper in this final report.

Instructional Settings

Special education practices are coming under increased criticism particularly as they relate to instructional settings. Five comprehensive and well documented sources relating to the need for alternatives in our present practices are presented by Dunn (1968), Christopolos and Reniz (1969), Lilly (1970), Iano (1972), and Hammill and Wiederholt (1972). All of the authors are concerned about the almost exclusive use of the self-contained classroom and the lack of alternatives in special education, as well as the effect of current practices upon the emotional and academic growth of handicapped children. These authors direct most of their attention to practices regarding the mentally retarded as service arrangements for the learning disabled have only received priority in the last decade and little research is available concerning this field. However, these sources do indicate the increased dissatisfaction with present administrative and service arrangements in special education and reflect the need for alternatives.

Traditionally, pupil organizations have varied by the type of exceptionality being served, administrative preference, historical precedence, and cost-effectiveness. Gearheart (1970) has suggested the following pupil organization as being successful in dealing with almost any exceptionality:

Segregated Plan: Special classes or a school not on the same site as a regular school. These may be private or public schools.

Partial Segregation: A section of regular school reserved for special education or special education on the same site as regular school. No plan to specifically integrate children with "regular" classroom activities. Partial segregation is recognized by attendance at school assemblies, events, lunch room, or whatever feasible.

Cooperative Plan: Special education classes in which pupils may spend some portion of the day in the regular classroom.

Resource Room: Pupil is registered in regular classroom, does most of his school work with the regular group and goes to the resource room and the special education teacher only for materials and special training.

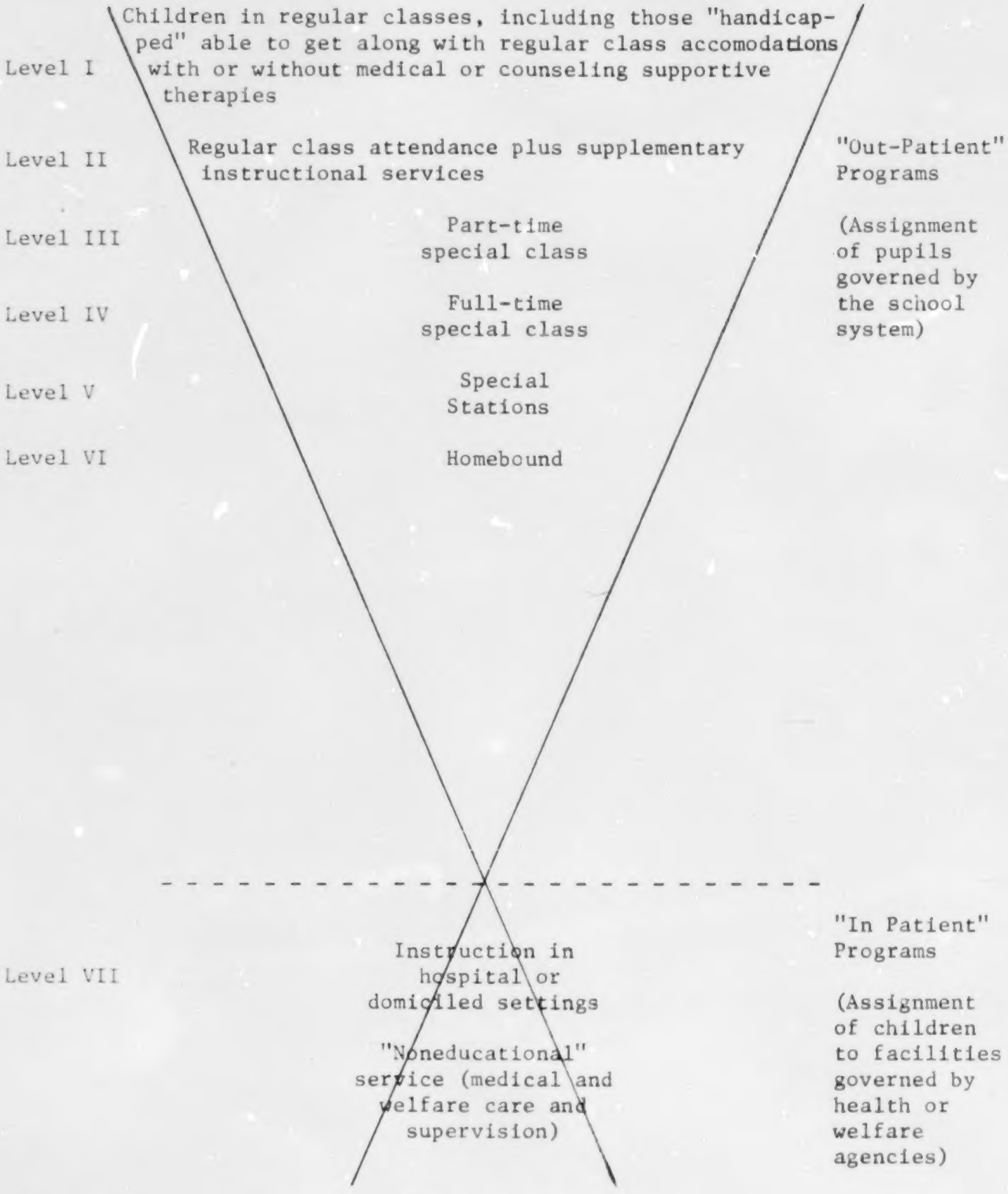
Itinerant teacher: Pupil is registered in regular classroom, does all his work with the regular classroom teacher, and receives periodic specialized training and materials from a traveling special education teacher.

Deno (1970) has offered a cascade system of special education services. This model is presented in figure II. The tapered design indicates the considerable differences in the number of pupils served at the different levels and calls attention to the fact that the system acts as a diagnostic filter. The most specialized facilities, such as homebound or hospital or domicile instruction, are most likely to be needed by the fewest number of children on a long-term basis.

This cascade system is designed to make available whatever different-from-the-mainstream kind of setting is required to control the learning variables deemed critical for the individual child. It is a system which facilitates the tailoring of treatment to individual children, rather than a system for sorting out children so that they will fit conditions designed according to group standards not necessarily suitable for the particular child. Deno also feels that this system is flexible and adaptable enough to make possible the reduction of special education enrollment while still retaining opportunity for those who require special education services.

Figure II

THE CASCADE SYSTEM OF SPECIAL EDUCATION SERVICE


Level I
Children in regular classes, including those "handicapped" able to get along with regular class accomodations with or without medical or counseling supportive therapies
Level II
Regular class attendance plus supplementary instructional services
"Out-Patient" Programs
(Assignment of pupils governed by the school system)
Level III
Part-time special class
Level IV
Full-time special class
Level V
Special Stations
Level VI
Homebound
Level VII
Instruction in hospital or domiciled settings
"Noneducational" service (medical and welfare care and supervision)
"In Patient" Programs
(Assignment of children to facilities governed by health or welfare agencies)

Reproduced from: Evelyn Deno, "Special Education as Developmental Capital," Exceptional Children, 37:229-237 (November 1970).

Deno's model differs from Gearheart's types of pupil organization in that it calls attention to the number of children needing service at each level and uses somewhat different wording. However, both authors present models for the provision of alternative service arrangements for exceptional children.

Another framework which comprises the variety of programs necessary for exceptional children has been presented by Reynolds (1962) as shown in Figure III. Reynold's model, like Deno's, indicates that these are of a broad range of services needed in order to meet the needs of the individual children. Reynolds feels that in all cases the view of the child should be directed toward returning him to the most ordinary, i.e. the regular classroom, as soon as possible. It is felt that the provision of a variety of arrangements facilitates this goal.

The need for several alternative service arrangements for learning disabled children brings with it a host of problems. No one school can be expected to have a consulting teacher, a supplemental teacher, a resource room teacher, a part-time special class teacher, and a full-time special class teacher. This is neither cost-effective or needed for the small number of children needing specialized help in some schools or even districts. Gearhart (1970) feels that if there is any hope for extending special education services it is through the development of some types of cooperative inter-district plan. He states that there are several alternative types of cooperation agreements that can be arranged depending upon the needs of a particular school district. The most common are discussed below.

Joint Agreement. Essential to any type of joint agreement is legislation that makes such a plan possible. In Illinois such a plan has been operational for sometime with one participating district having the primary administrative responsibility of which the remaining districts are called "members". A determination is made of what each member district is responsible for financially.

Cooperative Planning. Section 39.51 of Chapter 565, Wisconsin Laws of 1963, states:

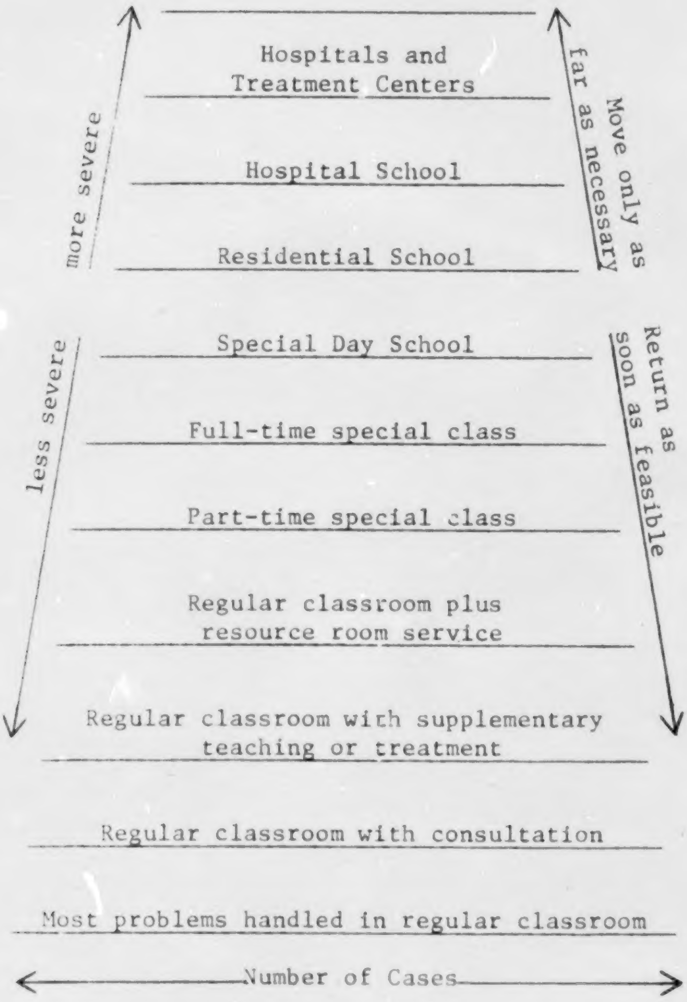
> The organization of school districts in Wisconsin is such that there is a recognized need for some type of service unit between the local district and the state superintendent level. There is hereby created such units designed to serve educational needs in all areas of Wisconsin. Such cooperative educational needs are created by the state as a convenience for local districts in cooperatively providing special education services to teachers, students, school boards, administrators, and others, and may include, but is not restricted because of enumeration, such programs as research, special student classes, data collection, processing and dissemination, in-service programs, and liaison between the state and local school districts.

The plan is well conceived and carefully implemented. It has an advantage over the cooperative plan in that it provides for the entire state, as well as a salary for an administrator and office expenses.

Special District. This model known as the St. Louis County Special District is one district which covers the entire county and has responsibility

Figure III

SPECIAL EDUCATION PROGRAMS


Hospitals and Treatment Centers
Hospital School
Residential School
Special Day School
Full-time special class
Part-time special class
Regular classroom plus resource room service
Regular classroom with supplementary teaching or treatment
Regular classroom with consultation
Most problems handled in regular classroom
more severe
less severe
Move only as far as necessary
Return as soon as feasible
Number of Cases

Reproduced from Maynard C. Reynolds, "A Framework for Considering Some Issues in Special Education," Exceptional Children, 7:367-370 (March 28).

for those children who are defined as "handicapped". This special district would ordinarily be twenty-five districts, with twenty-five special programs, and children with handicaps conditions that were not often encountered would probably not be served. This large district also has an evaluation clinic which utilizes the team approach and an in-service training program that would be impossible for one or two districts to maintain.

Intermediate District. In Michigan the intermediate school district is a county or multi-county district which makes provisions for the levying of an extra millage used for special education programming. The board of the intermediate district will provide services when the local district is unwilling or unable to do so.

Chalfant (1967) concluded his research on the economic and demographic variables which effect the provision of service for handicapped children with the following recommendations.

> The major implication of this investigation concerns the organization of community resources in mobilizing low expectancy counties for providing specialized educational services. The results suggest that it is not sufficient to provide legislation permitting school districts to establish cooperative programs under permissive law. This investigation has identified a number of low expectancy counties that would not be able to support specialized programs, even if they were ordered to do so under mandatory law. To be successful, legislative or administrative provisions should be based on those factors that are related to the support of special education services.
>
> The special education expectancy index provides the means for studying counties in terms of economic and demographic resources related to public school provisions for exceptional children. The index can be used (a) to predict the expectancy of counties to provide special education services, (b) to compare objectively the expectancy of counties to provide services, and (c) to provide a differential diagnosis of the factor assets or deficits of specific counties. Because the index is based on data that are easily accessible and the procedures for obtaining an index have been developed in this study, it would be possible to obtain an index for a state in a very short time.
>
> The index would be potentially useful at both the state and local levels. If an intermediate administrative unit existed, the index would also be useful at that level. A state board of education or an advisory committee could use the index for recommending legislative provisions for low expectancy counties which are unable to support specialized programs. For example, the socioeconomic status and financial ability factors identified in this study emphasize

> the need for a more adequate financial base for school support among low expectancy counties. This might include provisions for a reimbursement plan based on need or a major revision in the tax structure for school support.
>
> The importance of the urban factor stresses the need for enlarging pupil population bases. This has implications for the organization of multidistrict, county, or multi-county arrangements to support special education services. In lieu of placing complete responsibility for planning and organization at the local level, there seem to be several advantages in coordinated statewide planning by a state board of education or an advisory committee. First, those involved in study or planning would hopefully be knowledgeable in the problems and factors which should be considered. Second, a coordinated statewide study based on objective criteria would provide several alternative plans, which would insure that every district or county was included in a program that had the necessary economic and demographic base for operation.
>
> The concept of the intermediate administrative unit offers a realistic solution to many of the problems confronting not only special education, but other educational programs as well. The intermediate unit is a broad and flexible concept which is in the direct line of state school organization. The regional agency can be applied in a number of ways to mobilize the resources of low expectancy counties to meet the educational needs of exceptional children.
>
> Regardless of whether the intermediate administrative unit assumes responsibility for providing services to school districts that are unable to provide the service themselves, or whether the intermediate unit assumes only administrative responsibility, the need exists for an administrative unit to act between the state and local district level and mobilize community resources for public education (pp. 54-55).

As noted earlier, one difficulty in learning disabilities is the fact that the small number of children needing services in one area may preclude the availability of the alternative programs as stressed by Deno, Reynolds and Gearheart. In addition to cooperation between districts, a plan for training teachers to function in several roles might be another possibility. For example, employing Reynold's model, the resource teacher might have a part-time special class and provide resource room service with supplemental teaching or treatment to children in the regular classroom. In addition, the resource teacher might provide consultation to the regular classroom teachers in order that the treatment for some children might be handled in the regular classroom. The itinerant teacher might also perform these multiple roles in several schools by traveling from one school to another where the population needing service is very small.

Another possibility for providing service to areas and/or schools with a sparse population of handicapped children is through the decatorization of service arrangement. For example, one teacher might be responsible in a school or schools for all children who might be labelled "emotionally disturbed," "mentally retarded, " and "learning disabled." The current categorical funding methods, as well as the expertise of teachers, make this approach somewhat difficult.

Regardless of whether the learning disabled child is serviced in a part-time special class, resource room, or itinerant program much attention has been directed toward consulting support to the regular classroom teacher (Brown, 1972, McCarthy, 1969, Hammill and Wiederholt, 1972). The role of the consulting teacher, according to McKenzie (1971), is to manage and educate handicapped children in the regular classroom with the bulk of the instructional intervention performed by the regular classroom teachers. The success of this model is speculative at this time but is receiving increased popularity as learning-disability teachers attempt to meet the needs of the children who, given the present amount of personnel and funds, would otherwise not receive educational assistance.

Little research is available on the effectiveness of these service models when used with the learning disabled. McCarthy (1969) compared the itinerant program of the "psychoeducational diagnosticians" with the more traditional resource room program, which required bussing for the learning disabled children involved. Thirty-nine children in the resource program were matched on six variables with 39 children in the itinerant program. The results of this comparison of the two groups indicated that the children in the itinerant program did as well, and in some areas better, than those in the resource program. Also, more children were served in the itinerant program making it more cost-effective.

There are methodological difficulties inherent in researching the efficacy of the service arrangements in learning disabilities (Kirk, 1964, MacMillan, 1971), but every attempt needs to be made in delineating those variables which contribute to the success of each type of arrangement. Hammill and Wiederholt (1972) suggest that the future research efforts in this area should not be directed toward the comparison of one arrangement to another for specific groups of handicapped pupils, but that the individual characteristics of children relative to their success in the different settings should be investigated. Information of this nature will aid in assuring that each child is placed in that setting which is appropriate to his instructional needs.

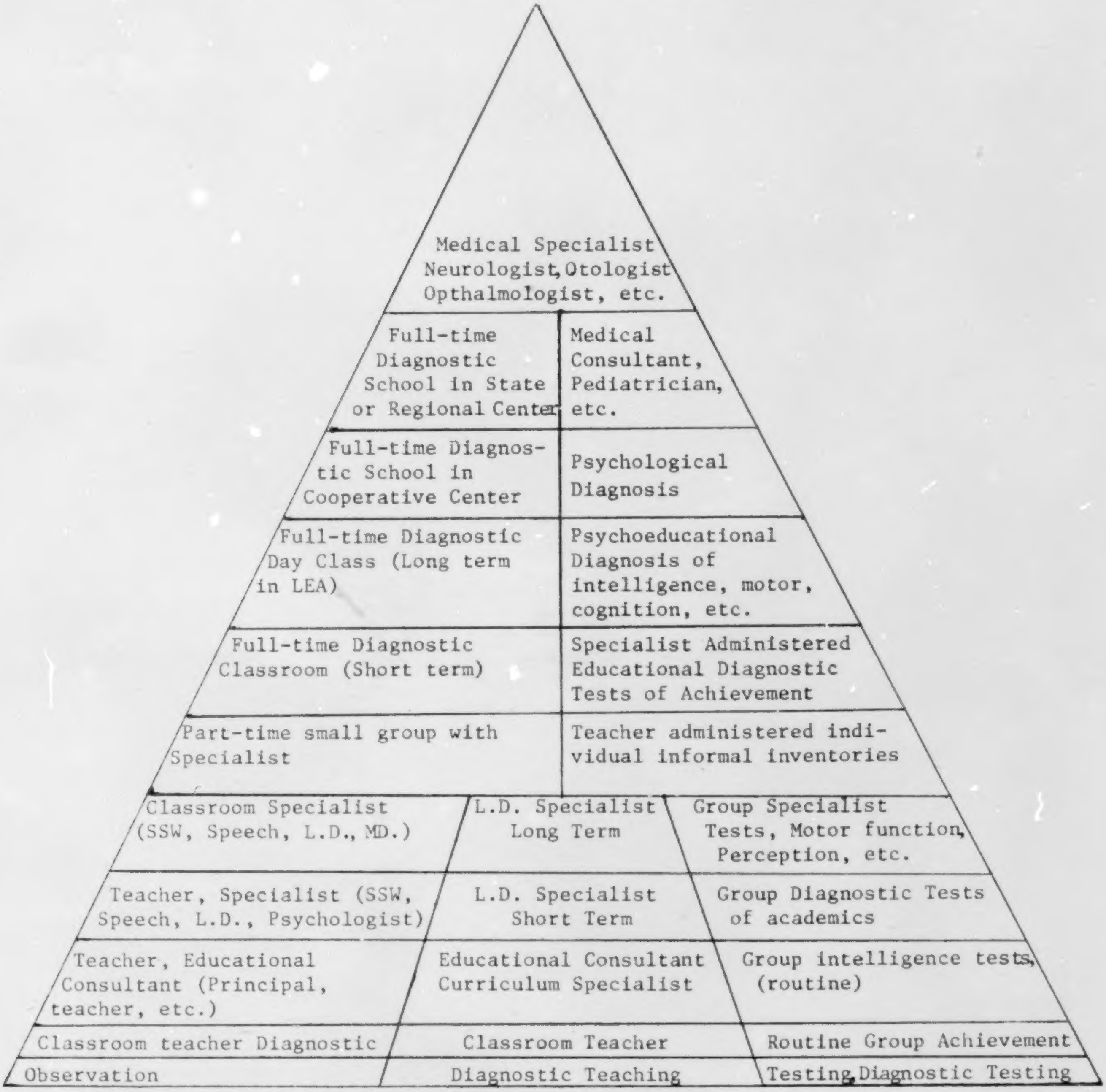
Using Reynold's hierarchy of ten special education programs, McCarthy (1972) has related this model to the type of diagnostic services needed at each level for the learning disabled pupil (see figure IV). She states that these diagnostic and remedial services do not exist in every school, but do exist in some school systems, and ought to exist in others. As in Reynold's model, the number of children needing the more intense diagnostic and service arrangement decreases as the number of qualified personnel available is reduced.

In McCarthy's diagnostic model, the learning disabled children will be diagnosed, formally or informally, by the regular classroom teacher. Where this diagnostic data is inadequate, the teacher involves other educators.

> At the third level of service, the teacher will involve a specialist, perhaps the school social worker, the speech clinician, the nurse, the psychologist, or the learning disabilities specialist who will then consult with the

Figure IV

HIERARCHY OF DIAGNOSTIC SERVICES IN THE PUBLIC SCHOOLS


Medical Specialist Neurologist, Otologist Opthalmologist, etc.
Full-time Diagnostic School in State or Regional Center
Medical Consultant, Pediatrician, etc.
Full-time Diagnostic School in Cooperative Center
Psychological Diagnosis
Full-time Diagnostic Day Class (Long term in LEA)
Psychoeducational Diagnosis of intelligence, motor, cognition, etc.
Full-time Diagnostic Classroom (Short term)
Specialist Administered Educational Diagnostic Tests of Achievement
Part-time small group with Specialist
Teacher administered individual informal inventories
Classroom Specialist (SSW, Speech, L.D., MD.)
L.D. Specialist Long Term
Group Specialist Tests, Motor function, Perception, etc.
Teacher, Specialist (SSW, Speech, L.D., Psychologist)
L.D. Specialist Short Term
Group Diagnostic Tests of academics
Teacher, Educational Consultant (Principal, teacher, etc.)
Educational Consultant Curriculum Specialist
Group intelligence tests, (routine)
Classroom teacher Diagnostic Observation
Classroom Teacher Diagnostic Teaching
Routine Group Achievement Testing, Diagnostic Testing

McCarthy, J. M. Education: The basis of the triangle. Proceedings of M.B.D. Conference, N.Y. Academy of Science (unpublished), 1972.

> teacher at the third level, or at the fourth level to collect data specific to their speciality. Perhaps the psychologist will collect base line data on out-of-seat behavior, or on task behavior, or blurting-out-behavior. Or the speech clinician may do a language screening test. As we move up to the diagnostic hierarchy, the focus of the diagnosis may shift from the classroom to the specialist's office, to a diagnostic classroom in the local school districts on a part-time, short-term basis, or on a full-time, long-term basis. In some areas of the country, especially those with cooperative programs between school districts, the focus of the educational and psychological diagnosis may transfer to a center out of the home school district. With the recent impetus toward Model Centers or Resource Centers, the focus of the diagnosis may be far removed from the classroom in which the need was first determined. The most intensive diagnostic centers frequently operated, at least in some states, as hospital schools. At each stage in the hierarchy the specificity of the diagnostic tools also increases, moving from group tests of intelligence and achievement to group diagnostic achievement tests to individually-administered achievement tests, to the most delineated and complete psychological and psychoeducational testing (pp. 8-9).

McCarthy recommends that an awareness of the alternative treatment levels needs to exist in order that the learning disabled child will not be moved further up the diagnostic and service treatment levels than absolutely necessary. "Using this philosophy, educators and psychologists will not recommend to parents that a neurological and an EEG is in order since the appropriate treatment might be provided by the general practitioner or the pediatrician. Nor would a physician recommend special class placement when the appropriate treatment might be provided by the general practitioner or the pediatrician (p. 10)."

The diagnostic practices in special education are under serious attack. For the most part, the dissatisfaction is based upon feelings that special education relies too heavily upon tests and scales which may be culturally unfair and educationally useless. Hammill (1971) provided a discussion on the disadvantages and hazards of formal testing. His concerns were directed toward the generally inadequate reliability and demonstrated validity or educational relevance of the most commonly employed tests.

The diagnostic practices are employed in most cases for the purpose of labelling children as having a particular handicap as defined by law in order to make special education services possible through financial reimbursement. In some cases, this has led to inadvertent misdiagnoses and improper placement of children. For example, in the case of the educable retarded, Garrison and Hammill (1971) found in their study that 25% of children classified as "educable retarded" passed four of five criteria for normalcy and that only about 33% of youngsters in educable classes in Philadelphia could be labeled "retarded" with confidence. They state that "the stigma of learning the label 'retarded' is bad enough, but to hear the label when your placement is questionable or outright erroneous is an intolerable situation (p. 20)."

Criteria for receiving services in learning disabilities vary from locale to locale, yet in this area as in other special education handicapped areas concern is being voiced about inadvertent discrimination against minority groups. Franks (1971) studied the ethnic characteristics of educable and learning disability classes in Missouri and reported that blacks make up 34% of the educable class enrollment, but only three percent of the learning-disability class enrollment. Such funding can only contribute to a growing disenchantment of minority people with learning-disability practices.

For information concerning treatment practices in these instructional settings, the reader is referred to that section in this final report.

Learning Disability Pupils

Subject variables, such as characteristics, incidence and correlates of learning disabilities, have been discussed elsewhere in this final report. The reader is referred to that section.

Media

The important functions of the media which bridges the communication problems between these various organizations and professions has been described by Havelock (1971).

> There is no doubt that communications media of various sorts are important in bridging the gap between components of the macrosystem. Innumerable journals and magazines explain research to practitioners and practice to consumer in various areas. Such media create awareness of new products, new scientific discoveries, and new practices long before they are made available on a mass scale. Hence they prepare practitioners and users for what to expect in the near or distant future; they alert them to potential needs, potential dangers, and potential benefits that they had never concerned before (p. 3-32).

The problem with the media as an integrating force is its inability to involve the audience directly and actively in the communications process. Without two-way interaction it is very difficult to arouse involvement in the average user (Havelock, 1971, p. 3-33).

Despite this problem the professional journals in education such as The Journal of Learning Disabilities, Exceptional Children, Journal of Special Education, Psychology in the Schools, etc. are effective information exchange mechanisms. Annual conferences held by the Council for Exceptional Children, the Association for Children with Learning Disabilities, etc., are also effective means of information exchange.

The roles of the LTI, RRC's, and IMC's can be viewed as mechanisms to quickly and efficiently transmit current knowledge from one organization to another. In-service training, special conferences, regional meetings, etc. can also be viewed as integration forces between and among professionals and parents concerned with the education and general well-being of children with learning disabilities.

This section of the paper contained a description and discussion of the organizations in the field of learning disabilities. Strengths and weaknesses of each component part of the framework of learning disabilities were delineated. However, in addition to improving the current practices in this field, attention must also be directed to forces outside the field of learning disabilities so that integration of the entire educational system can be developed and maintained. The next part of this section contains a list of some of these trends.

Trends in Education

The field of learning disabilities does not operate independent of other areas of exceptionality or even regular education. There are currently many issues and developments within these fields that may ultimately exert a great deal of influence upon the future of learning disabilities. The following list contains, but is not limited to, some of these issues and developments.

1. Professionals and parents are discussing the possibility of non-categorization of special education. The feeling is that a great number of children with mild to moderate problems do not differ significantly enough in educational needs to continue the somewhat expensive categorization process of exceptional children. If this trend becomes widespread there will be no reason to continue to have separate administrative and service arrangements to many of the learning disabled as they would be receiving educational aid in classrooms with the emotionally disturbed, mentally retarded, or with children in regular classrooms.

2. In learning disabilities, as in other areas, concerned psychometricians are discussing the lack of available criterion measures sophisticated enough to discriminate between the "culturally deprived" and "emotionally disturbed" child from the "learning disability" and "mildly retarded" youngsters.

3. Cost effectiveness is being questioned and demanded by parents and the general public who are asking what their tax dollars are buying as well as the need for certain expensive programs. As a result, educators are attempting new service arrangements, consolidation of school districts, etc. One can expect that even more demands will be placed on educators to demonstrate the validity of their practices.

4. If revenue sharing becomes law, additional state and federal involvement in assuming some of the financial burden from local school districts will be made available. With this financial assistance may also come more state and federal control over educational practices.

5. The educational needs of the "culturally different" are still very great and much effort, talent, and resources are being channeled into minority education. Title I of the ESEA provided $1.5 billion for the education of disadvantaged groups. The relationship of the culturally different and the field of learning disabilities remains unclear.

6. Efforts to reshape and free the classroom from its rigidness and incorporate more freedom in the schools are common in the public school system. A new view of children and their development is evidenced in alternative systems such as the "free school," "open-classroom concept," Parkway Project, etc. The

results of these developments may significantly decrease the numbers of children referred for special services.

7. The age level at which children enter school and adults leave the educational system is changing. There is a renaissance in early childhood education as well as in the education of adults who desire more training or job retraining. Efforts for the learning disabled, especially at the adult level, deserve more attention.

It is extremely difficult to speculate as to what these and other trends in education may have upon the field of learning disabilities. Professionals and parents differ in their attitudes and beliefs regarding such issues as decategorization, revenue sharing, etc. Because of this, the various universities, scientific organizations, parent groups, etc. will probably adopt different policies regarding certain aspects of learning disabilities, special education, and regular education practices. Alternative directions for the future should probably be considered and attempted. However, because of this wide diversity, the field of learning disabilities needs sophisticated management techniques to insure that these alternative actions do not become mutually destructive but rather generate various acceptable ways of dealing with the education of the learning disabled. A discussion of some management techniques follows.

Management Techniques

Management of a system is necessary in order to avoid overlap of effort, aid all subsystems in working for the common goal, and to insure cost-effectiveness. Umans (1971) states that the skills of management when applied to education focus upon planning, organization, communication and evaluation. She further states that as the key figure in the educational system is the student the objectives for him must be defined, alternative plans for achieving these objectives must be stated, methods of accountability must be specified, data must be gathered, and the process of rethinking our objectives based upon new information need to be redefined. Several structured methods of dealing with the process of management have been employed with success in industry and government. Several techniques have been isolated as representing some of the methods which can be applied to the field of learning disabilities.

System Analysis. Quade has defined systems analyses broadly as "an orderly analytic study designed to help a decision maker identify a preferred course of action from among possible alternatives. . . (Lynden and Miller, 1967, p. 292)." Applying systems analysis to education is more difficult than when used in government or business. This is probably due to the fact that the educational process is very complex, educators must agree upon the objectives of this process, and there is an absence of valid and reliable instruments to measure the results of the educational process. However, despite these inherent weaknesses, the system approach does provide a method of integrating all relevant knowledge and facilitates analyses of the problem as well as formulates ways of dealing with the problem (Umans, 1971). One such technique is the Planning-Programming-Budgeting System (PPBS).

PPBS was introduced to all departments and agencies in the federal government by President Johnson in 1965. Under the PPBS each department was responsible for:

> Developing its objectives and goals, precisely and carefully; evaluate each of its programs to meet these objectives weighing the benefits against the cost; examine, in every case, alternative means of achieving these objectives; shape its budget request on the basis of the analysis, and justify that request in the context of a long-range program and financial plan (Lynden and Miller, 1967, p. 5).

In this government action each Cabinet and agency head appointed a staff of experts, who defined the goals of their department which enabled them to develop alternatives to meet these goals and to select that alternative which was the most effective and least costly. This process was felt to encourage a sounder decision-making process through a more accurate and detailed analysis of information which aided in pinpointing things that ought to be done in more quantity and spotlighted those things that should be done in less quantity. (Umans, 1971).

The school system of New York City and one district in Skokie, Illinois are presently applying the PPBS approach in their districts. In New York, organizations, budget, personnel, and curriculum are subjected to this approach. "Under each area PPBS analyzes: (1) the educational and/or social objectives involved; (2) the major feasible alternatives; (3) for each alternative, the best available estimates of the benefits (and/or penalties) relevant to the objectives for each year considered; (4) for each alternative, the best available estimate of the total cost for each year considered; (5) the major assumptions and uncertainties associated with the alternatives; and (6) the impact of each alternative on other programs, other activities, other levels of the school system, and upon private organizations, if applicable (Umans, 1971, p. 46)."

While there is little new in this approach, PPBS does place emphasis upon the organizational objectives with an analysis of the objectives in terms of alternatives to meet the specified goals. The efficacy of this system when applied to education is still tenuous but does offer a framework to guide administrators in their decision making.

Another technique of management is Program Evaluation and Review technique (PERT). When the United States Navy began the Polaris Atomic Submarine Project they found that it was necessary to communicate with 250 prime contractors and over 9,000 subcontractors so that all of the efforts would contribute to the total project. PERT offered an effective tool in reducing uncertainty so that decisions making and action taken were pertinent to the actual problem and had a predictable possibility of success.

PERT is actually a network which is essentially a graphic representation of a plan. This plan displays an orderly step-by-step series of action which must be successfully performed to reach the defined objective. In planning this network three methods can be used: backward method, forward method, middle method. The backward method moves backward from the objective by asking at each step what must be done immediately prior to reaching this step. This method is continued until the beginning step is reached. The forward method is accomplished by asking at each step what must be done immediately after completing a step or task. The middle method can be used in the elaboration and refinement of the network or in the development of the plan through both the forward and backward methods at the same time. After the network has been drawn up to a workable plan, a considerable amount of power and control is added by applying time estimate to each task or step within the network (Stires and Murphy, 1963). Unlike PPBS there is no provision for cost information in this system. However, PERT has been used as a method of contrasting task to time which makes it application to education beneficial.

Dr. Margaret A. Scheffelin, California State Department of Education, prepared for this Leadership Training Institute's final report, a paper on the Balanced Power for Service (BPS) Model. Excerpts from Dr. Scheffelin's paper describing this model follows:

1.0 THE BALANCED POWER FOR SERVICE (BPS) MODEL

1.1 Schematic and Description

Figure I presents the Balanced Power for Service model. It will be noted that there are five hierarchical levels, starting with the population to be served, and then moving through the delivery system, the management system, the control system and the action forces. Five functions can be discerned: service, evaluation, training, communication, and financing. The service function permeates all levels. The research function is shown as a particular slice through the model. Shown in a similar manner are the training, communication and financing functions. The BPS Model can be applied to a wide range of programs and units of analysis: from the federal government and federal programs to a state or local program; from an entire building, such as an elementary school to a serve room, such as a classroom or an itinerant teacher's work situation all by himself, or what might be called a "one-for-one situation.

1.2 ASSUMPTIONS ON EDUCATION UPON WHICH THE BALANCED POWER FOR SERVICE MODEL IS BASED

1.2.1 It is not possible to describe an operational model (OM) for education which is appropriate for all states, all sites and all seasons.

1.2.2 It is possible to describe the specifications for a decision model (DM) upon which an OM can be constructed to be appropriate for any state, any site, and any season.

1.2.3 It is the responsibility of the citizenry to set goal priorities, through channels, in allocating goods and services through the governance system.

1.2.4 It is the responsibility of administrators to carry out policies for services based on citizen-set priorities and to report on the degree to which the policies have been carried out and the extent to which the services were provided.

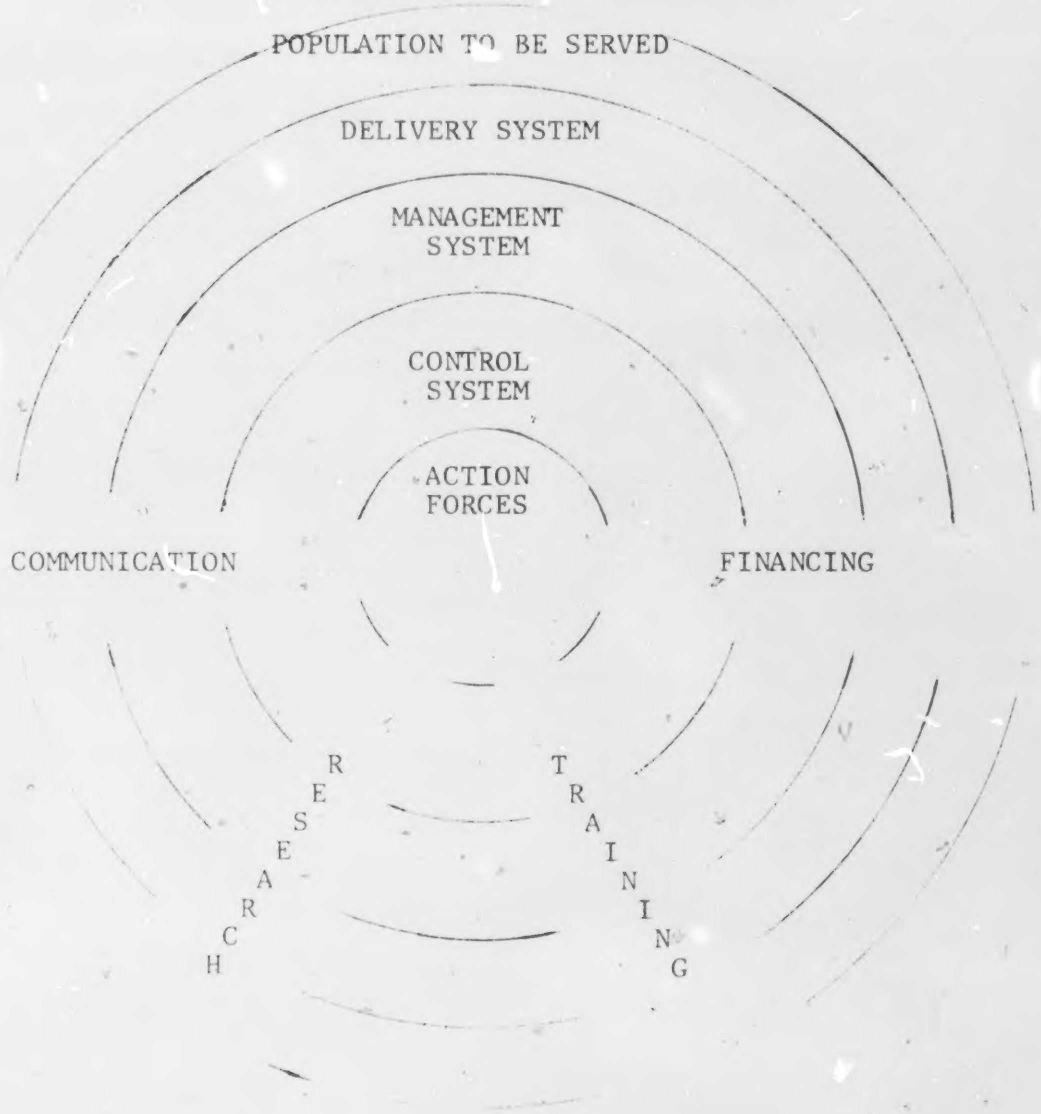

POPULATION TO BE SERVED
DELIVERY SYSTEM
MANAGEMENT SYSTEM
CONTROL SYSTEM
ACTION FORCES
COMMUNICATION
FINANCING
RESEARCH
TRAINING

Figure 1

Balanced Power for Service Model

1.2.5 Any or all educational service programs are planned, provided, and modified within a context of formal and informal constraints. These constraints include laws, regulations, public expectations, and geographic, demographic, and physical resources.

1.2.6 Existing and predictable formal and informal constraints must be considered in the process of generating any operational model from the decision model.

1.2.7 The nature of the education service program will vary according to the scene (scene means density of population, terrain, climate, transportation, time, communication facilities, and population characteristics).

1.3 Scope and Responsibility

What governmental unit will be responsible for maintaining the BPS Model? The federal government could be designed as the responsible unit, but at present, education is a function left to the states by our Constitution. For the foreseeable future, the state will probably continue as the responsible unit. In the nationwide picture, one would have to think of a Balanced Power for Service model which would subsume at least 54 states and territories and the overseas dependent schools. It is not feasible to present 55 simultaneous diagrams; the reader is best left to his imagination and creativity. Meanwhile, an example is a particular state may serve to show the operation of the model.

2.0 THE BPS MODEL APPLIED TO CALIFORNIA

The chief service program in California for persons with learning disabilities is the state-supported Educationally Handicapped Minors Program (EH Program) for pupils in grade levels kindergarten through grade 12. The levels and functions of the BPS Model will be described as they relate to California's EH program (see Figure 1).

2.10 LEVELS

2.11 ACTION FORCES

The action forces in the center of the BPS model are the collective individual citizens of California. Each citizen makes an individual decision based on his opinion of the needs of persons with learning disabilities and his observance of programs for those persons. These citizens act individually and collectively through their voting on and lobbying for, legislative and administrative issues. The courts are another action point through which individuals ask for redress of grievances and petition for increased, modified, or decreased services. Recently, courts have been asked to prevent the delivery of services which are seen by an individual as inappropriate or inadequate.

2.12 CONTROL SYSTEM

The control system for the EH program consists of elected officials such as the Governor, the Superintendent of Public Instruction, the Controller and the Legislature. Forming one important working part of the control system is the State Board of Education whose members are appointed by the Governor and confirmed by the Senate. Other working parts are commissions dealing with education, whose members are typically appointed by the Governor or the Superintendent of Public Instruction. Two important commissions are the Commission for Teacher Preparation and Licensing (appointed by the Governor) and the Commission on Special Education (appointed by the Superintendent and the State Board of Education).

2.13 MANAGEMENT SYSTEM

The management system for all education, including the EH program, is composed of the state agencies which manage the fiscal and human resources applying to education. These agencies include the Department of Finance, the Controller, and the Department of Education.

Within the Department of Education is the Division of Special Education. One of the bureaus of the Division of Special Education, the Bureau for Mentally Exceptional Children, is responsible for the EH program. The Bureau and Division interact with other units and divisions in the Department of Education in order to assist local education agencies in the initiation, operation, and review for revision of EH programs in school districts and counties. The Department of Education, through the Division of Special Education, operates five state schools. The two Diagnostic Schools for Neurologically Handicapped children serve some children and youth with handicaps such as learning disabilities. In this respect, the management system in California is simultaneously a delivery system.

2.14 DELIVERY SYSTEM

The delivery system in California refers to local education agencies (LEAs) which deliver educational services to children and youth with learning difficulties through the EH program. It should also be noted that in California the EH program is a permissive program. "Permissive" means that a school district or county superintendent of school chooses whether or not it will offer an EH program or any part of an EH program. The full EH program consists of four types of service arrangements. The service types vary in nature, amount, location and relationship with the regular program. As shown in Table I, the Service types range from a full day special class to indirect support of the regular classroom teacher.

TABLE I

The Four Types of Service Arrangements in California's Educationally Handicapped Program

Legal Name of Type of Service arrangement	Nature of Service to Pupil	Amount of Service	Location of Service	Relationship of Service with the Regular Program
Special Day Class	Direct	Full Day (integration in regular program permitted)	Separate classroom/ teaching station	Pupil integration permitted
Learning Disability Group	Direct	30 minutes up to half-day (remainder of day in regular program)	Separate teaching station	Pupil spends at least half day in regular program
Home and Hospital Instruction	Direct	Three hours per week (no regular program)	Home or Hospital	Teacher Coordination with Curriculum
Special Consultation	Indirect (assistance to teachers and other school staff)	Varies in number of hours or minutes	Both on and off the school site	Assistance provided to regular school staff

2.15 POPULATION TO BE SERVED

The population to be served in the EH program can be described in number and type. Quantitatively, the population takes two forms: potential and actual. Computed at the legal ceiling of two percent (2%) of the four and one-half million pupils enrolled in California public schools, the potential population is approximately 90,000. The actual population served during the 1971-72 school year by 500 LEA's was more than 55,000. There is a turnover in the EH program of approximately 15% during a school year as pupils return to regular class, or enter regular class for the first time. Therefore, the cumulative number of pupils served through the EH program in any one school year is greater than the number actually enrolled in the program at any one time.

Qualitatively, the population to be served in the EH program is composed of a range of children and youth with learning disabilities or behavior disorders, or both, who cannot benefit from the regular program. The current program provisions permit service to pupils in grade levels kindergarten through 12th grade. Wide variation in individual pupil characteristics is both expected and observed.

2.20 FUNCTIONS

2.21 Training

Training covers both preservice and inservice training of the people providing the EH program. These people range from teachers to administrators and evaluators. Included are the trainers of teachers, school psychologists, administrators, and other professional personnel responsible for the EH program. The programs offered by some thirty training institutions vary in breadth and timeliness. The absence of a special credential requirement for teaching in an EH program has interfered with the orderly establishment of degree programs in some training institutions. Evaluation, administration and supervision training programs are particularly scarce. The Commission for Teacher Preparation and Licensing, the Commission on Special Education, the Department of Education, the training institutions and professional organizations are all working on the problem of credentialling teachers.

Currently there is considerable demand for practical, inservice training, both on campus and off campus. Some institutions cooperate with LEA's by providing opportunitites for teacher practicum in EH programs conducted during the regular school year and in extended year sessions (summer school).

The total K-12 school population has decreased in California during 1970-71, but the decrease in some age cohorts is balanced by the current trend to providing access to educational opportunities at age four. This change in pupil population has implications for needed changes in training programs. The development of doctoral-level programs holds out the promise of increased future capability for providing appropriate preservice and inservice programs.

2.22 EVALUATION

Statewide EH program evaluation is conducted by the Department of Education through surveys and analyses of LEA documents such as requests for starting and expanding such programs. At the LEA level, pupil and program evaluation are required annually. Evaluation and reporting procedures vary.

The Division of Special Education is currently developing a master plan for Special Education in California. One of the major components of the Plan is "Management", including planning, development and evaluation. The plan will also be addressed to the meshing of the year-old provision for expending 0.0016% of the state funds allocated to special education toward research, program development, and evaluation. To perform the research, the Department of Education contracts with outside agencies and with the two campuses of the University of California which operate joint doctoral programs in special education with two campuses of the California State College and University system.

The Division of Special Education will conduct a three-year PL 91-230, EHA-B project to develop and use a special education model, applicable to programs for exceptional children and youth.

There is current dissatisfaction with the extent of dissemination of information about research and evaluation projects--including the basic fact of their existence.

2.23 COMMUNICATION

The main statewide communication is between LEAs and the control system including the Department of Education. The primary basis for communication is "a.d.a. for $". That is, enrollment and attendance data from the LEAs are traded for operating money from the State. The Department of Education is working intensively with the California Educational Information System and the LEAs to develop the capability for a communications network, which would emphasize the operation and results of programs more than their fiscal aspects. The network may revive California Education, the statewide journal published by the Department of Education for many years.

The interlocking nature of federally funded programs with state and locally funded programs is difficult to show on a model. In California, the communication between these types of programs is becoming more systematic and fruitful.

2.24 FINANCING

The basis for financing special programs has taken three forms in the past eight years. The current form of state funding of EH programs has four separate subprograms, one each for Special Day Class, Learning Disability Groups, Home and Hospital Instruction, and Specialized Consultation. LEAs may levy additional special taxes. The complexities lead the present writer to conclude that a detailed description would be counterproductive.

The financing can be briefly be summarized as follows:

- $46 million dollars was appropriated by the Legislature (71-72).
- Reimbursement determined by a combination of program types and average daily attendance (a.d.a.).
- A particular pupil's attendance can count from one a.d.a. to one-eighth of an a.d.a., depending upon the type of program in which he is enrolled and the length of time he is served.
- The current restriction on enrollments and on growth of enrollment in programs creates hazards for an LEA administrator attempting to estimate a year in advance what the program budget might be.

The California School Finance model is under scrutiny. Suggestions for change are being made in the Legislature, at the State Board of Education, in the Department of Education, and local districts. The California Supreme Court and the Supreme Court of the United States of America will no doubt determine the future of school finance. Any predictions are at this point premature.

3.0 SUMMARY

Written goals, objectives and procedures for evaluative, administrative, and service arrangements for learning disabilities in particular education units are necessary. Maintaining and improving an operating program is impossible if these arrangements are not adopted, assented to, and carried on. The nature of a written commitment provides that institutional stability and longevity which is necessary now, and which will be necessary as long as people are mortal and mobile.

The point is not to "sell" any of these systems approaches but rather to give examples of what large organizations have attempted in managing their system. Perhaps what is needed in education is a management system which is designed to meet the unique needs of education rather than attempting to modify an existing system which may have been developed for an entirely different set of management problems.

An evaluation model was also chosen for inclusion in this report. The ability to continually evaluate and modify activities where needed during any action is important in the management scheme.

Paulson (1970), editor of a publication by Teaching Research, defines evaluation "as a process of examining certain objects and events in light of specified value standards for the purpose of making adaptive decisions (p. 1)". Applying this definition to education broadens the evaluation procedure from the traditional concerns directed toward outcome measures. This definition focuses not only upon output, but also input, process, and output effectiveness. It allows for making adaptive decisions throughout a project as they are felt to be needed. The Stufflebeam Model discussed here has direct bearing upon the educational system. Saslow (Paulson, Ed., 1971) states that Stufflebeam was concerned about the shaky state of educational evaluation and the nature of the evaluation process and has developed a method of building activity through the decision making process.

Stufflebeam approaches evaluation through the following steps:

1. Identifying the major levels of decision-making served such as local, state and national.

2. At each level the decision situations are projected in terms of locus, focus, criticality, timing, and alternatives.

3. Criteria are defined for each situation by stating the measurement and standards employed in judging the alternatives.

4. The policies within which the evaluation must operate are defined.

Stufflebeam's model is called the Context, Input, Process, and Product (CIPP) model. He defines each step as follows:

Context evaluation identifies and assesses needs, defines the context, and identifies and delineates problems.

Input evaluation identifies and assesses system capabilities, available strategies and designs for implementation.

Process evaluation identifies or predicts problems that might be encountered in design or implementation. Also a record of events and activities are maintained at this level.

Product evaluation relates the outcome information to objectives, context, input and process information. This stage allows for decisions to be made concerning the future of the activity.

Saslow concludes:

> . . . Stufflebeam's C.I.P.P. model emphasizes process evaluation for the assistance of an on line decision maker, not as an end in itself, but within a four-fold framework of context, input, process, and product evaluation. Stufflebeam sees the evaluator not as an outside observer, but as an inside participant. He shares responsibility to society, for project effectiveness and accountability, with other members of the team (Paulson, ed., 1970, p. 43).

Summary

Learning disabilities practices require a clearcut division of labor, a coordination of activities, and a colloboration on future direction. This section of the final report delineated some of the strengths and weaknesses of the field of learning disabilities relating to these and other requirements and presented some alternatives to current practices. The next part of this section of the final report contains conclusions regarding the activities of USOE and State Educational Agencies as well as some conclusions on other factors relating to service arrangements. Consultants from the field have read the information in this report and the conclusions and have made recommendations concerning future direction.

Conclusions and Recommendations

The following conclusions were derived from this survey on administrative and service arrangements to the learning disabled.

1. Public Law 91-230, Title VI, Part G, has allowed BEH/USOE to fund 23 State Education Agencies for approximately $125,000 for a two year period to develop model service centers for pupils with learning disabilities.

2. These centers, known as Child Service Demonstration Programs (CSDP), after rigorous evaluation and refinement, are to serve as models in stimulating statewide service to the learning disabled. Each of the 23 State Educational Agencies are to assume financial responsibility for replicating the CSDP in the state.

3. These model centers differ from one another in focus, educational programming, evaluation, and replication strategies.

4. The staff and consultants of the Leadership Training Institute in Learning Disabilities provide technical assistance support to the CSDP.

5. USOE has funded numerous other programs which provide service to learning disabled pupils. However, the extent and specific type of service being provided by these programs is difficult to determine.

6. Laws concerning the provision of special education support to the learning disabled vary from state to state and do not necessarily indicate that these pupils are receiving service.

7. Administrative fiat is employed in some states where laws do not exist specific to the learning disabled through manipulation of rules and regulations governing the provision of services to handicapped children in general.

8. It is difficult to present an accurate description of the current level of services and criteria for eligibility for service to the learning disabled in each state due to an inadequate communication and information flow mechanism.

9. Accurate incidence figures for the number of learning disabled children requiring service is also unavailable. This is due in part to the lack of comprehensive diagnostic capabilities within each state for such a task as well as the uncertainty and variability that currently exists concerning the specific characteristics of the population.

10. Despite the unavailability of an exact reading of the number of children receiving and/or needing learning disability services, it is safe to assume that many of these handicapped children are currently not receiving special education support.

11. In extending services, special attention should be directed toward those pupils needing educational support in sparsely populated areas as well as children from the lower socioeconomic levels of society.

12. Where educational services do exist for this population, they include the following settings: (1) residential special classes, (2) special schools, (3) day special classes, (4) cooperative classes, (5) resource rooms, or (6) itinerant services. The efficacy of these arrangements remains uncertain.

13. Management of the system of education needs to be improved in order to insure that there is a clear-cut division of labor, a coordination of activities, and a collaboration on future directions

RECOMMENDATIONS

The following recommendations were submitted by Mr. Frank King.

1. Consideration should be given to funding fewer CSDP's and providing the ones that are funded with a greater amount of money, perhaps at approximately $150,000.00 a year with a guarantee for three years of funding. The implication from the larger and longer funded CSDP's would have more merit for future practices in the field.

2. Some considerations might be given to broadening the technical assistance provided by the LTI to all federally funded projects in learning disabilities. This would provide a common source of communication and might reduce duplication of efforts particularly with projects that utilize a model that has been demonstrated as ineffective.

3. A special research project should be funded at the national level, perhaps jointly with NINDB and BEH, for the purpose of establishing a scientifically valid definition of learning disabilities and developing instruments that would be useful in educational diagnosis and planning.

4. Once an operational definition is available a national survey should be established for the purpose of attempting to determine incidence figures.

5. A section of existing title VI-G funds should be used for training state department consultants in learning disabilities on current thoughts and practices in the field, how to conduct in-service training, etc.

6. The results of the evaluation of the CSDP's should be made generally available to all interested parties.

The following recommendations were submitted by Dr. Margaret Scheffelin.

1. Programs for prenatal and infant nutrition should be funded in order to aid in insuring sound bodies and minds in all children.

2. A federal center for the study and improvement of learning and performance needs to be permanently funded. This center should be monitored by the National Advisory Committee for the Handicapped and administered by a director nominated by the President and confirmed by the Senate.

3. 0.001 percent of the money derived from taxing units should be allocated to the direct benefit of the six million persons with present or potential learning disabilities for three types of systems: (a) Service - to provide minimal necessary instructional services, (b) Training - to provide on site training to upgrade the completeness of those persons administering and instructing, (c) Evaluation - to assess and modify the services and training systems and audit the allocation of capital.

The following recommendations were made by Dr. Jeanne McCarthy.

1. Funding for the individual CSDP's needs to be increased as well as the number of years of federally funding. The two year period ought to be

extended for at least three years with some viable options for continued funding.

2. The mechanism of forward funding (committing funds for two years out of a one year fiscal budget) needs to be discontinued as it leads to erroneous assumptions on the part of the legislators on the amount of money actually available for operation.

3. Although model centers need to reflect the idiosyncrasies of each state, a "model" model center should be established at a high level of funding.

4. It is imperative that an up-to-date survey of services to learning disabled children in each state be compiled including those funded through the RRC's, IMC's, discretionary funds, EPDA, Early Childhood, Developmental Disabilities, title III, I, etc.

5. Efforts such as the drafting of model legislation for learning disabilities recently completed by CEC and disseminated by the Education Commission of the States and HATCHE should be encouraged.

6. Incidence figures should reflect only those children who deviate so markedly from the norm of their group as not to be able to profit from instruction in the regular classroom. This approach to incidence would vitiate the current tendency to label children disabled who reflect deficiencies in curriculum and teaching inadequacies.

7. The priorities placed on learning problems may be quite different in poverty areas than in more affluent areas. It may be necessary to spend time and money on even more basic needs, i.e., nutrition, other health care, sleep, etc.

8. Need exists to match the intensity of both diagnostic and remedial services to the degree of the disability in the child.

9. A different system for funding public schools is mandatory and long overdue. Inadequacies of educational opportunity are intolerable.

REFERENCES

Brickell, H. M. (ed.). Planning the future of the special education instructional materials centers and regional media centers. New York: The Bureau for the Education of the Handicapped, 1972.

Brown, U. L. Issues and problems in mainstreaming. Unpublished manuscript. University of Minnesota, Duluth, 1972.

Chalfant , J. C. Factors related to special education services. Washington, D. C: The Council for Exceptional Children, 1967.

Christoplos, F., and Renz, P. A critical examination of special education programs. Journal of Special Education, 1969, 3, 371-379.

Clements, S. D. (ed.). Minimal brain dysfunction in children. Public Health Service Publications, No. 2015. Washington, D. C.: U. S. Department of Health, Education, and Welfare, 1969.

Deno, E. Special education as developmental capital. Exceptional Children, 1970, 37, 229-237.

Dunn, L. M. Exceptional children in schools. New York: Holt, Rinehart and Winston, 1963.

First annual report, national advisory committee of handicapped children. Special Education for Handicapped Children. Washington, D. C.: U.S. Department of Health, Education, and Welfare, 1969.

Franks, D. J. Ethnic and social status characteristics of children in EMR and LD classes. Exceptional Children, 1971, 37, 537-538.

Garrison, M., and Hammill, D. Who are the retarded? Exceptional Children, 1972, 38, 13-20.

Gearheart, B. R. Administration of special education. Springfield, Illinois: Charles C. Thomas, 1970.

Hammill, D. Evaluating children for instructional purposes. Academic Therapy, 1971, 6, 341-353.

Hammill, D. D., and Wiederholt, J. L. The resource room: Rationale and implementation. Fort Washington, Pennsylvania: The Journal of Special Education, 1972.

Havelock, R. G. Planning for innovation through dissemination and utilization of knowledge. Ann Arbor, Michigan: Center for Research on Utilization of Scientific Knowledge, Institute for Social Research, The University of Michigan, 1971.

Iano, R. P. Shall we disband our special classes? Journal of Special Education, 1972 (in press).

Kirk, S. A. Research in education. In Stevens, H. A., and Heber , R. (eds.). Mental retardation: A review of research. Chicago: University of Chicago Press, 1964, pp. 57-99.

Lilly, S. M. Special education: A teapot in a tempest. *Exceptional Children*, 1970, *37*, 43-48.

Lucito, L. J. (ed.) *Study of the need for educational manpower for handicapped children and youth-Phase III report*. Silver Spring: Operations Research, Inc., 1970.

Lynden, F. J., and Miller, E. G. *Planning programming budgeting: A systems approach to management*. Chicago: Markham Publishing Company, 1967.

MacMillan, D. L. Special education for the mildly retarded: Servant or savant. *Focus on Exceptional Children*, 1971, *2*, 1-11.

McCarthy, J. M. *Classroom programming for children with learning disabilities*. A paper presented at the 47th Annual Convention of the Council for Exceptional Children, Denver, Colorado, April 6-12, 1969.

________. *Education: The basis of the triangle*. Proceedings of M.B.D. Conference, N.Y. Academy of Science (unpublished), 1972.

McKenzie, H. I. *Special education and consulting teachers*. Based on a paper presented at the Third Banff International Conference on Behavior Modification, University of Calgary, Calgary 44, Alberta, Canada, April, 1971.

Paulson, C. F. *A strategy for evaluation design*. Teaching Research, A Division of the Oregon State System of Higher Education, 1970.

Reynolds, M. C. (ed.). A framework for considering some issues in special education. *Exceptional Children*, 1962, *7*, 367-370.

Silverman, L. J., and Metz, A. I. *Numbers of pupils with specific learning disabilities in local public schools in the United States: Spring 1970*. Washington, D. C.: Educational Manpower Statistics Branch, National Center for Educational Statistics, U. S. Office of Education, 1970.

Stires, D. M., and Murphy, M. M. *Modern management methods PERT and CPM: Program evaluation review technique and critical path technique*. Boston: Materials Management Institute, 1962.

Trudeau, E. (ed.). *Digest of state and federal laws: Education of handicapped children*. Arlington, Virginia. The Council for Exceptional Children, 1971.

Umans, S. *The management of education*. New York: Doubleday and Company, Inc. 1971.

Weintraub, F. (ed.). *State legislation for children with learning disabilities*. Arlington, Virginia. The Council for Exceptional Children, 1970.

RECOMMENDATIONS FOR PROGRAMMATIC RESEARCH

N. Dale Bryant

and

J. Lee Wiederholt

August 1972

This final report has presented discussions on the progress and problems that currently exist in the field of learning disabilities. Particular attention has been directed toward definition, characteristics, incidence, and correlates of learning disabilities pupils; methods and materials presently utilized in the education of children with this handicapping condition; preparation of teachers in this field; and administrative and service arrangements to children with learning disabilities. Each discussion of these topics also contain recommendations by consultants for the Leadership Training Institute. The purpose of this section of the report is to make additional recommendations for specific programmatic research based upon the analysis of the field as presented in this final report.

There are a multitude of research needs in the field of learning disabilities and hopefully many of them will be supported. However, a few are basic to all others and so crucial to the concepts and actions within this area that they are exclusively concentrated upon in this section. The most critical and primary need is to overcome the obstacles encountered in operationally defining the population to be served.

The present movement in the field appears to be toward accepting underachievement as a sufficient definition of learning disabilities sometimes with exclusions of other handicapping conditions and other times without exclusions. If this trend is followed, the operational definitions of learning disability will be only in terms of the achievement measures to be used and the degree of underachievement accepted as a criterion of disability. Of course, appropriate tests would have to be validated at the pre-school level.

It is our belief, based upon the literature, contacts with consultants and other professionals, that the movement of the field toward a definition that is synonymous with educational handicap or underachievement is the result of the lack of an operational definition. Most of the field would hold to a concept of psychological learning disorders. Most of the people in the field also want measures that not only define the specific disabilities but that suggest treatment interventions.

Therefore, the following recommendations have as their goal the identification of specific learning disabilities with a direct relationship of this assessment to instructional intervention. The successful completion of this proposed research would be of benefit not only to the field of learning disabilities, but to all of special and regular education.

Three research steps are proposed for accomplishing this task: (1) a series of criterion measures of learning ability need to be developed, (2) an encompassing model of learning disabilities needs to be generated with measures developed to validly reflect the model, and (3) there needs to be research studies on specific disability-treatment interaction. Each of the three proposed steps will be described below.

Criterion Measures of Learning Ability

Children may be underachieving for other reasons than a learning disability. The critical need is to identify children who have "real" impairments in learning that cannot be readily overcome by minor variations in regular classroom instruction. The essential test of a disability rests in the amount of difficulty that a pupil has in learning when sound instructional principles are utilized. Therefore, criterion measures consisting of tests of learning need to be developed for those elements that make up basic academic skills and language development. There may be many ways that this can be done but one is given as an example in the following steps:

1. Crucial skill elements for each disability area should be identified at various levels of skill development. An example in reading-word recognition, such elements might include:

   a. learning letter and short word discrimination,

   b. learning to recognize two- to four-letter words,

   c. learning to recognize longer words and use them in reading simple sentences.

2. Trial learning tasks should be established for each task level of each skill element.

   a. a check should be made that the child does not know the skill to be learned but has some mastery of prerequisite skills (e.g., if a child is not familiar with letters, he would not be tested with learning words but rather in learning letter and word discrimination).

   b. Each trial-learning task should use optimum learning procedures. Where very different procedures might produce different results, the trial learning should allow both variations to be evaluated; e.g., kinesthetic practice in writing or copying the words to be learned might improve word discrimination and retention. Learning should be evaluated both with and without kinesthetic practice. Some children may be helped and some children, particularly those with writing problems, may learn words less well with writing practice. Amount of material to be learned might be another significant variable to be evaluated. Positive reinforcement should be used to encourage adequate and standard motivation on the task.

   c. The learning tasks should be normed for children at that stage of learning. Thus, when an underachieving child is referred as a possible learning disability case, the learning disability specialist, the teacher, or psychologist can administer a criterion measure to determine if he actually has a disability in learning. The cutting score on the norms can be adjusted so that disability may be in the bottom 3%, 5%, or other percent on a learning task. Hopefully, the disability cases will represent a skewness and possibly a small second mode below the scores that could reasonably fit on a normal curve and so would fall completely below normal expectation.

If the child has a disability, its nature is known by his successes and failures on criterion learning procedures. Treatment planning, research, and administrative planning of service can be initiated for him and others with the same disability pattern rather than for a heterogeneous group of different disability cases.

If the child has no disability or has trouble learning with one method but not another, then information can be given the teacher on how the child can successfully learn. The learning disability specialist may have to serve as a teacher consultant for the many children with suspected but not actual learning disabilities. Criterion measures would give the information needed to guide the teacher.

An example of a criterion measure is presented below. It is recognized that every variation would have to be tried out and that the trial learning would have to be found to be reliable. There may be many ways to test learning ability but the following example is offered only to clarify the points just made.

1. Trial of learning to read sight words. Norms might be based upon three groups of children; e.g., middle first grade, familiar with letter and some sight words, learning three and four letter words; middle second grade reading level, learning five to seven letter words; middle third grade reading level, learning six to ten letter words.

2. Twelve words would be selected that the child does not know.

   a. The first variation employed might be in the amount of material to be learned; e.g., three words at a time vs. six words at a time. Three words, then six words, then three words would be learned in three brief sessions with a five-minute break between each session.

   b. Another variation might be in the use of kinesthetic practice. For six of the words (three of the six learned six at a time and three of the six words learned three at a time), with the child tracing the word every time it is presented.

   c. A third variation might be phonetic vs. non-phonetic words, six non-phonetic words could be balanced out over conditions one and two.

   d. Another variation of teaching might be a presentation of stimulus word on a card and naming it for the child. After the cards in one learning session (either three or six) have been shown, they would be shuffled and shown again with the child recognizing them or if not, being told the word again. This procedure would be repeated until the words had been correctly recognized four times after which it would be removed from the deck of cards being learned. The procedure would be repeated until every word had been recognized the criterion number of times. The learning score could be the number of errors made for each word before criterion is reached. After all 12 words had been learned and after some standard review, tests of ability to discriminate words from similar words could be given. Tests of retention on subsequent days or tests of recognition of the words in simple phrases or sentences could also be used.

3. The various scores representing learning six words vs. six words for each condition could be compared with the appropriate norms. The procedure could be repeated for increased reliability in questionable cases or at different times to determine improvement in learning with age or treatment.

The example given above is only one possible criterion measure that a research group might come up with but it does demonstrate a procedure that in 20-50 minutes could not only differentiate a disability from adequate learning ability, but could also provide information as to the importance of amount of material being learned at any one time, the value of kinesthetic practice, the use of phonic cues, or other variations that might be used. All of these evaluations could be done not only for the initial learning but for retention (if tested later) and for recognition of the words when reading easy sentences. Probably no other information obtained in the same amount of time could provide as much practical guidance to the classroom teacher.

There are several other ways that criterion measures could be developed. If an optimal learning program with branching programs for particular problems were available in each area, then the point of breakdown on a program would be a criterion measure. However, developing an optimal learning program in each area would be a larger and more time consuming project than the criterion measures even though it might be a better long range solution.

Another technique would be to use a learning task based upon unfamiliar materials (e.g., artificial letters and newly learned words) but such measure would have to be validated against criterion measures such as those described earlier.

Obviously, it is not possible to have a criterion measure for every sub-skill even in one disability area, but a few well-selected points in the learning sequence should identify the presence and nature of the disability. Use of rate such as is used in the probes in precision teaching might be appropriate instead of numbers of errors or number of trials to reach criterion. The methods can be worked out in programmatic research aimed at developing criterion measures of learning disability.

Model Development and Validation

Another focus of programmatic research should involve:

1. Developing a model of disabilities in terms of the underlying processes involved in learning. Alternative models should be considered and tested against hard data.

2. Validating the model by testing the existence of the processes involved and testing the hypotheses drawn from the model about their relationship to learning disabilities and to other processes.

3. Developing measures (or using existing tests) of the processes (and possibly their interactions) with reliability and validity (this could be established by convergence if external criteria are not available).

4. Developing remedial strategies (or using existing ones) for the process deficits identified by the model.

5. Validating the measures and the model by accounting for nearly all the variance in criterion measure by means of the tests. This would produce a set of process measures that could be used with the criterion measures. The

process measures should be useful in planning treatment, in more finely describing disabilities, and in carrying out research. With or without the model building and the process measures described above, treatment X disability interaction programmatic research is needed to identify the most effective treatments. This research is needed for groups identified as specific kinds of learning disabilities on the basis of the criterion measures and/or using the dimensions based upon the process measures just described.

Disability Treatment Interaction

To carry out such a study requires developing remedial strategies based upon the process model and criterion measures. Specific disability groups would receive alternative treatments suggested by the model and measures and perhaps a standard treatment based only upon a task analysis. The interaction of process deficits with treatment elements could be evaluated within and across disability groups. Treatment elements would probably be something like kinesthetic practice, not entire programs like Fernals or Gillingham.

Once criterion measures of learning disability are developed and tested, their use as a defining variable or at least a descriptive variable should be encouraged in state programs, in government research projects, and even in doctoral dissertations and other non-government research. Once a common measure is available then studies and service arrangements can be standardized. Incidence and prediction values can also be established. Not the least important is the clinical value that the criterion measures will have. As they begin to be used, the profession will have to agree upon the normative cutting score to be used as defining learning disability or levels of learning disability. The actual disability in learning found in groups of emotionally disturbed, mentally retarded, environmentally disadvantaged, and other children can be identified and circumstances for excluding or including them in the category of learning disability can be determined by professional decisions based upon some data. Even with imperfect criterion measures, the field would begin to have a common referant when using the term learning disability. No other need seems quite so pressing and so basic to the development of the field.

In addition, the development of a model and process measure that account for various learning disabilities provides a scientific basis for the field of learning disabilities and is likely to lead to new insights and possibly new treatment procedures. The disability treatment interaction provides a data base for planning treatment of disability cases and even modifying regular classroom procedures to minimize the development of the handicapping condition.

As suggested at the beginning of this section, there are many more research needs in the field but these three should be considered for programmatic research directed toward the goals just outlined. The manner of initiating such programmatic research is not suggested here except that it clearly would need group effort from many disciplines (e.g., specialists in the disability areas such as reading, arithmetic, etc.) theoreticians, measurement specialists, representatives of various related disciplines, clinically experienced learning disability-specialists, etc. USOE has the expertise in requesting proposals or utilizing research centers for programmatic research. It seems essential that all three goals be coordinated in a program that will require a number of years of work. The results of the research would be specific products: criteria, model, measures, validated treatment. The effect of such programmatic research would be to establish learning disabilities as an effective and scientifically based discipline. It would also provide procedures for effective service to learning disabled children, to other special education areas, and to general education.